HEATING & VENTILATING
AIR CONDITIONING

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FOR NOVEMBER, 1937

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For Engineers and Contractors Controlling the Design, Specification, Installation and Maintenance of Heating, Ventilating and Air Conditioning.

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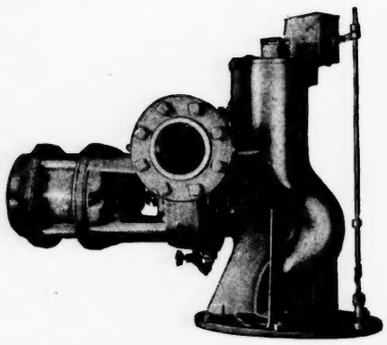

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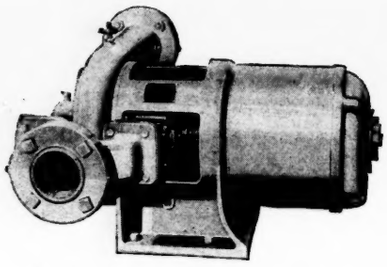

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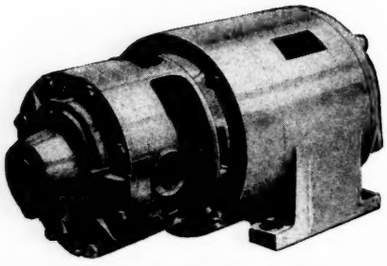

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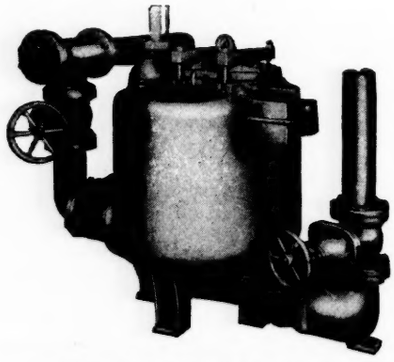

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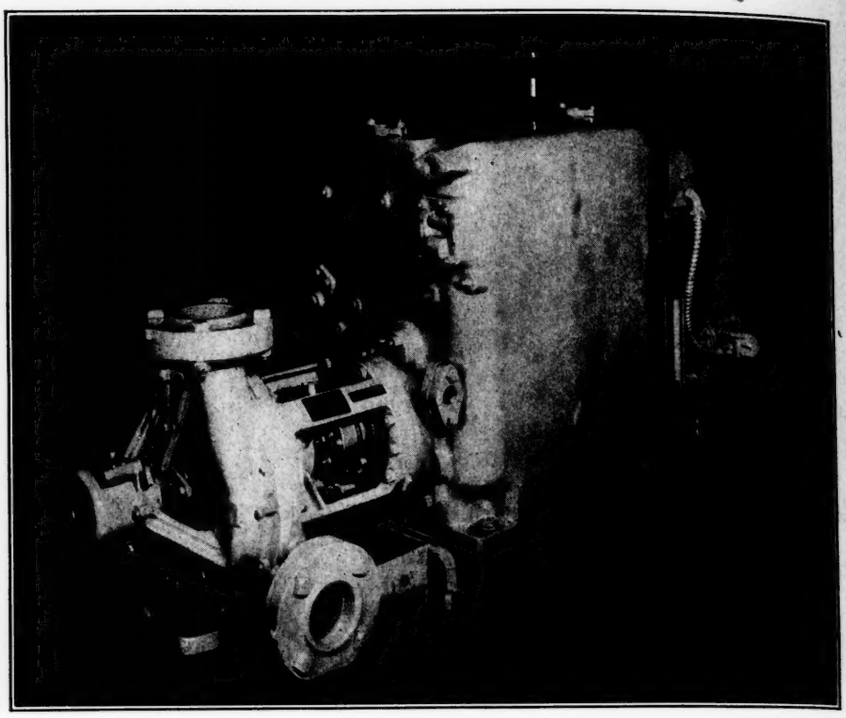

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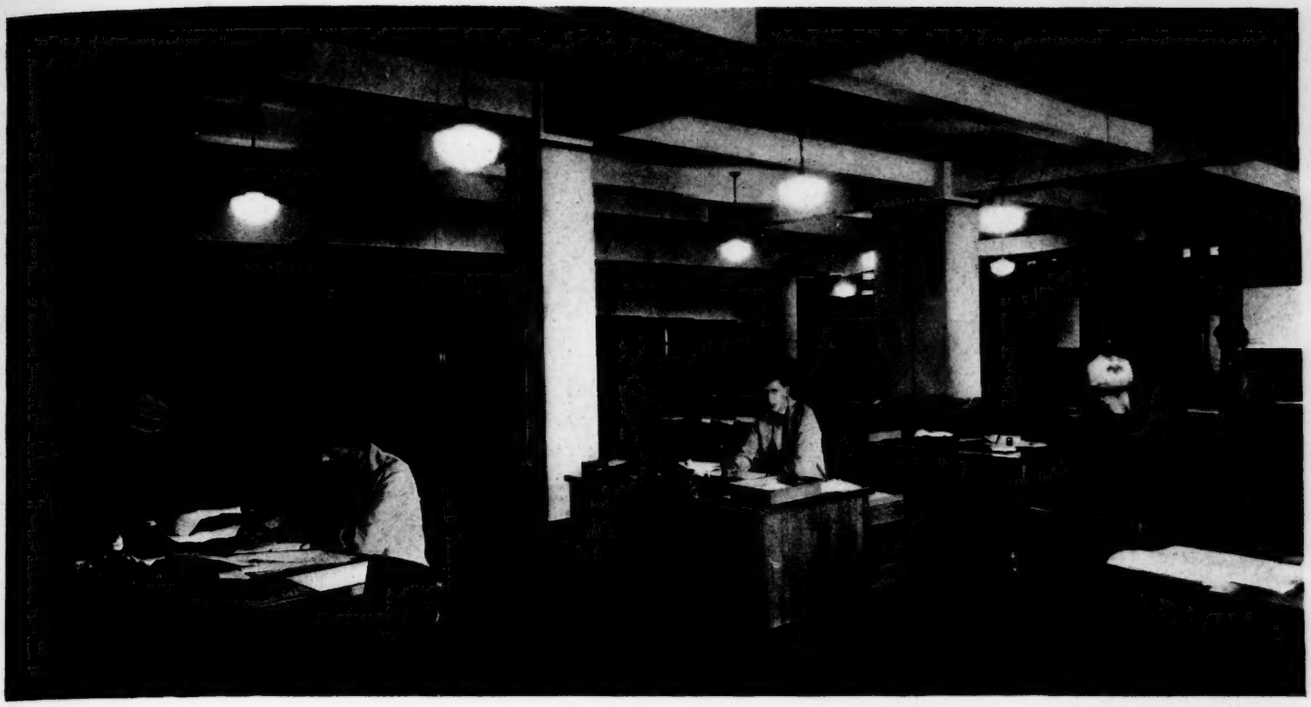


Fig. 1. View of office showing supply ducts in background.

A Study of Office Air Conditioning Using Ice

By CLIFFORD F. HOLSKE

Commercial Engineer, American Ice Co., New York.

Ice-cooled theaters and restaurants have become fairly common, but an ice-cooled office is still more or less of a rarity. The installation described here has an additional unusually interesting feature in that the office and its cooling plant are located on the 21st floor of a mid-town New York office building

ONE of the many interesting ice-cooled air conditioning installations made this year was the cooling plant installed in the 21st floor of the Liggett Building, 41 East 42 St., New York.

The space is occupied by the executive offices of the Knickerbocker Ice Company and the installation was designed to serve a dual purpose: to cool and condition the office space in the interest of the comfort and efficiency of the workers, and, in addition, to assist in promoting the sale of ice-cooled air conditioning equipment—a field in which this company has been particularly active. This company occupies the entire floor, a total of 8229 sq. ft. of usable space, of which a considerable portion is taken up by individual offices, all of which require conditioning. The total refrigeration requirement was calculated to be 18 tons and this was based upon the maximum probable future occupancy of the offices rather than upon the occupancy at the time the installation was made.

The location of the various offices, as well as the duct layout, is shown in Fig. 4. It was considered that the construction of the building would make it impractical to attempt to conceal the ducts. For this reason, the simplest and most direct type of duct layout was chosen. The supply grilles are equipped with adjustable deflectors. Fig. 1 will give the reader a good idea of the effect of a duct system of this type upon the appearance of a business office.

An assembled coil-type conditioning unit was chosen in preference to standard equipment because of the space requirement.

A No. 3½ multivane fan was used having a capacity of 6000 c.f.m. at 476 r.p.m. against a static pressure of ⅞ in. This is V-belt driven by a 3-hp., variable-speed, direct-current motor.

Supply duct velocities are in the neighborhood of 1200 f.p.m. and in no case exceed 1300 f.p.m. Approximately 2000 c.f.m. of fresh air is passed through the unit, the remaining 4000 being recirculated from a point near the exposed west wall in the large office and from the rear hall, as shown in Fig. 4.

The coil used in the unit is 60 in. long, 22 tubes high, and 4 rows deep. It has a net face area of

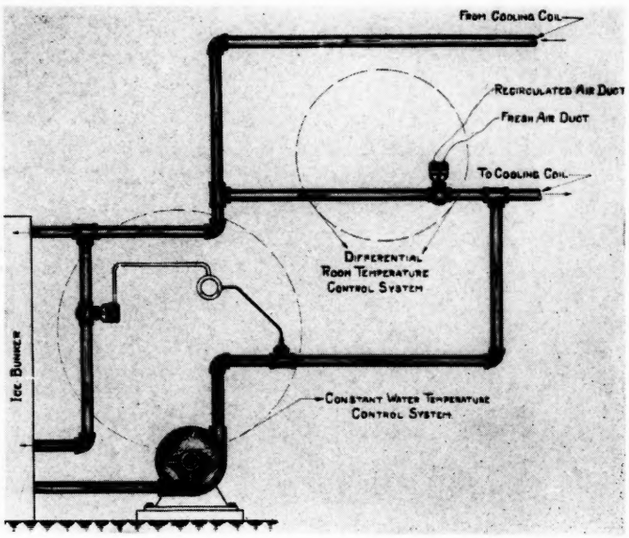


Fig. 2. Controls for ice cooled air conditioning system.

15 sq. ft. and approximately 1100 sq. ft. of cooling surface. The circulating pump has a capacity of 30 g.p.m. and is driven by a ½-hp. electric motor.

The system was designed to be operated not more than nine hours per day and on this basis, considering a refrigeration requirement of 18 tons, the required bunker capacity at 100% load factor would be 6¾ tons of ice. However, as our studies of load factor in air conditioning refrigeration equipment have demonstrated that most systems operate on load factors of from 30 to 40%, we felt safe in using a somewhat smaller bunker. The original design was based upon a bunker capacity of 5 tons, but this was increased to 6 because the location of the steel beams in the building structure made it necessary to alter the dimensions of the bunker somewhat in order to secure proper bearing points for the weight involved. Because of this, a 6-ton bunker was installed at approximately the cost required for a smaller bunker under these conditions. Because of the requirements of the building management, a special type of welded steel bunker was installed, using 10-gage steel sheets electric welded on the job into a seamless bunker reinforced with steel angles. Standard distributing sprays spread the water over the exposed ice surface for cooling.

A particularly interesting system of controls was worked out for this job and has proven to be extremely satisfactory. It is usual in ice-cooled air conditioning installations to include a thermostatically-controlled bypass valve so arranged that when the water reaches a predetermined temperature the water returning from the air conditioning unit is passed directly to the sump pit in the lower portion of the ice bunker. By means of this arrangement, there is assured a supply of cooling water at constant temperature and for all practical purposes it may be said that this temperature will remain constant without regard to the quantity of ice in the bunker. In this way, overcooling of the water, which would otherwise occur when the bunker is filled to capacity, is avoided and a consequent economy effected. As the ice charge decreases, the quantity of water circulated over the ice is automatically increased sufficiently to maintain the water temperature without variation until 80 or 90% of the ice charge has been consumed.

While constant water temperature is essential to proper air conditioning, this control does not offer any means of varying the conditions in the room to suit the conditions of loading. To accomplish the desired control of room conditions, a direct-acting differential type control was used. This valve is equipped with two elements, one to be placed in the fresh air duct and one in the recirculation duct. In this way the valve is affected by indoor as well as outdoor temperature. The valve is designed to maintain a zero differential at 75F outdoor temperature, the differential increasing with increased outdoor temperatures until the maximum differential of 12F at 95F is attained.

With this system of controls, the ice-cooled equipment becomes entirely automatic and it is not necessary to vary the fan speed in order to prevent over-

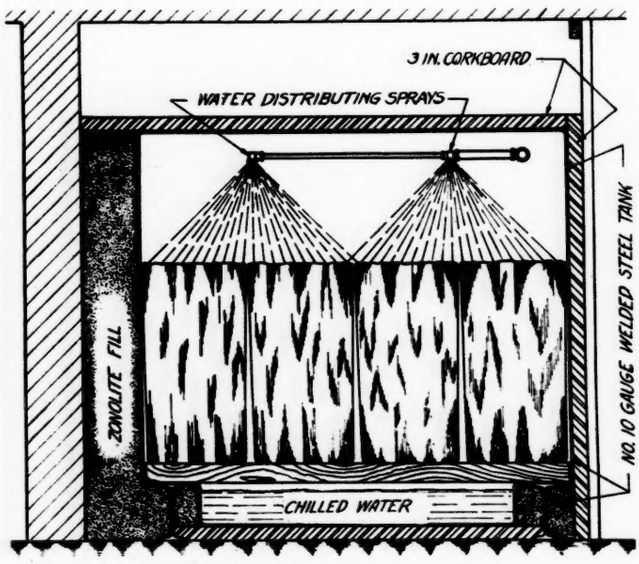


Fig. 3. Section of the ice bunker.

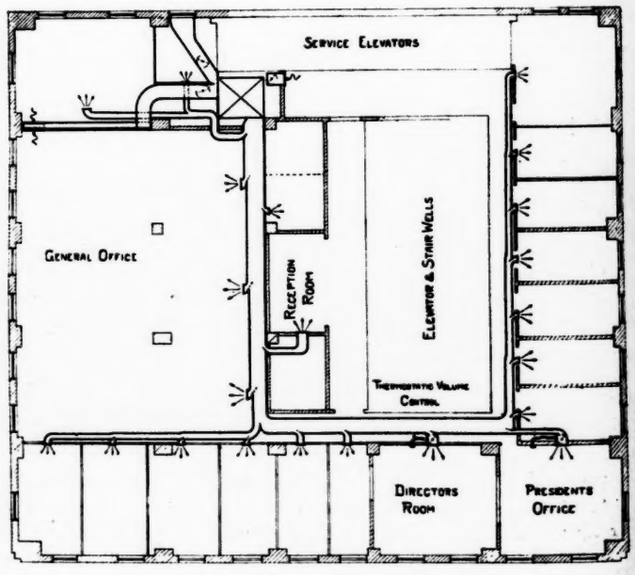


Fig. 4. Duct layout.

cooling at low heat loads. This is advantageous, as it is virtually impossible to contrive a system of distribution that will function effectively through any considerable range of air volume variations.

With 40F water, a relative humidity of from 40 to 50% was maintained under all of the conditions of loading encountered during the past season (1937).

Some idea of the magnitude of the load variation may be obtained from consideration of the temperature rise noted in the circulating water. The quantity circulated under this system of control remains constant at 30 g.p.m. The temperature difference across the coil, as noted on the pipe line thermometers, was at times as low as 6F and at other times as high as 16F. Under these widely varying conditions of loading, the temperature of the water supplied to the coil is held within 1F of the temperature for which the thermal controls are set, without difficulty.

To me the most interesting result of the operation of this system has been the opportunity to observe the psychological and physiological reactions of the occupants of this air conditioned space. While the average city dweller today may frequent air conditioned restaurants and places of amusement, it is still uncommon to be subjected to a continuous seven or eight hours of air conditioning.

One of the first reactions observed was a marked tendency on the part of many of the office workers to be dissatisfied with the cooling system on the grounds that the temperatures maintained were not low enough for comfort.

In one instance, a group occupying one of the offices preferred to have the windows open and the wall fans operating in the room despite the fact that with the windows closed the indoor temperature was 80F with a relative humidity of 47%, whereas the outdoor temperature at the time was 86F with a considerably higher relative humidity. Unquestionably, they missed the buzz of the fans, the flapping of the awnings, and the open windows which had become so firmly associated in their minds with summer comfort that a mere matter of temperature could not be considered.

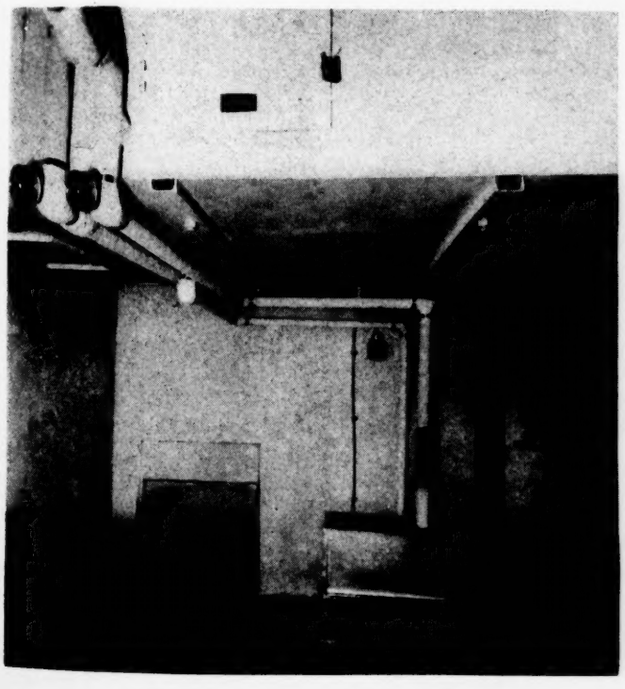
Virtually all of the employes tended to complain about undercooling during the early morning hours and this would in most cases continue until they left the conditioned space during the lunch hour and encountered the uncomfortable outside atmospheric conditions. After a few weeks of operation, complaints of this sort ceased entirely, indicating that the personnel had become accustomed to the new conditions.

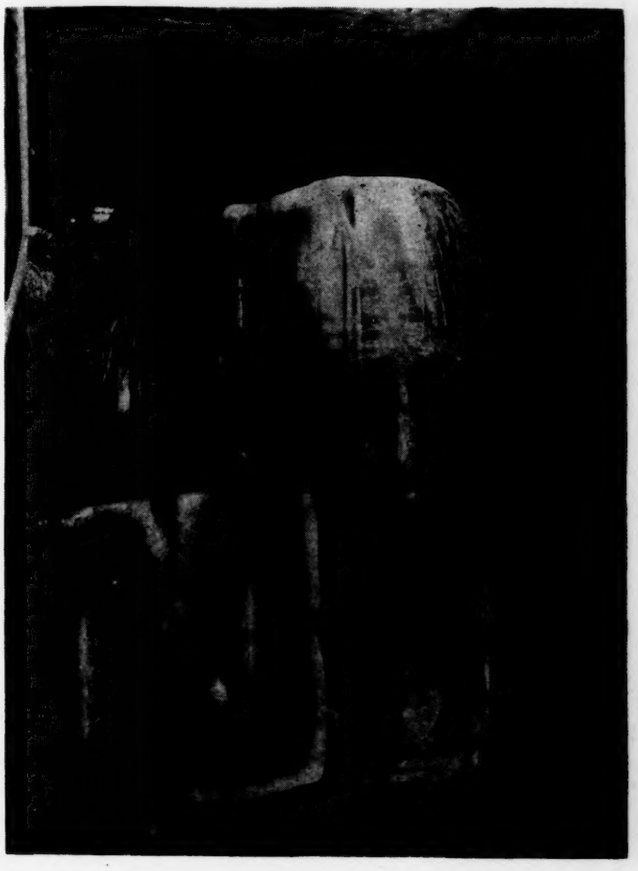
The following table shows the differential between indoor temperature in air conditioned spaces and outdoor temperature, which we have recommended for use in connection with ice-cooled air conditioning equipment. A relative humidity of 50%, or lower, is assumed in connection with these figures.

Outdoor Dry Bulb Temperature, F.	Suggested Indoor Dry Bulb Temperature, F.
75	75
80	77
85	79
90	81
95	83

It is my opinion, based upon a study during the past season of my own reactions to exposure to air conditioning over a relatively long period each day, that even these low differentials can properly be revised downward, when the air conditioned space is to be occupied by any one group of individuals for more

Fig. 5. (Below) View of the cooling unit showing circulating pump housed to deaden sound of d.c. motor. Fig. 6. (Right) Interior view of ice bunker.





than two or three hours at a time. I believe that for such occupancy a zero differential at 80F is perfectly satisfactory and that a maximum differential of 10F should be adhered to. This, of course, would not be productive of comfort unless a relative humidity of 45% or less could be maintained. Under this condition the shock effect incident to the leaving of the air conditioned space can be minimized and, in general, a more satisfactory mode of operation from the viewpoint of health and comfort attained.

The manager of the office in question reports an undoubted gain in efficiency as a result of air conditioning, but this gain could not be quantitively evaluated.

The total cost of this system including the cost of moving office equipment, necessitated by the installation, and the costs of redecorating, was $5000. This installation cost could have been reduced somewhat had it not been for the difficulty encountered in finding a suitable location in which the building steel would support the weight of the bunker and the ice charge. Had the office been located on the first or second floor, where it would have been feasible to locate the bunker in the basement, the cost would probably have been approximately $4000.

The cost of operating the pump and blower is apparently offset by the elimination of the wall fans with which the offices were previously equipped, so that the only additional operating expense is the cost of the ice. The ice consumption per season was estimated at 150 tons and it seems probable from the figures now available that the actual consumption will be somewhat lower than this. On a basis of the operating experience to date, it seems evident that the total operating cost will not exceed $500 per season.

Equipment List

Installation by: Typhoon Air Conditioning Co.

Differential controls: Fulton Sylphon Co., Knoxville, Tenn.

Thermostats and Aquastat: Mercoid Co., Chicago.

Bypass valves: General Control Co., Cleveland, Ohio

Grilles: The Register and Grille Co., Brooklyn, N. Y.

Circulating pump: Westco Pump Corp., Davenport, Iowa.

Heating with Diesel Engines

MANY diesel engine plants are performing a double job by supplying heat as well as power. Only one-third of the fuel consumed by the ordinary diesel engine is converted into mechanical energy, the other two-thirds being rejected as heat in the cooling water and exhaust gases. By the use of suitable economizers it is possible to recover all of the heat in the cooling water and about one-half of the heat in the exhaust gases. This makes the installation about 85% efficient in comparison with about 35% efficiency when the heat is not recovered.

The heat recovered can be used in a variety of manners—to heat buildings, to supply hot water for dishwashing in restaurants, or to supply heat for manufacturing processes. A recent article in "Business Week" describes some interesting installations of heat recovery from diesel engines. Some abstracts from this article follow:

The term "heat recovery," as used in connection with diesel engines, means the circulation of the jacket or cooling water of the engine through pipes and radiators to warm air, thus effecting the recovery of heat units which would waste if the diesel were used only to create electric power.

An installation was made in the summer of 1934 at the plant of the Rockford Screw Products Co., Rockford, Ill., when the company put in two diesels of 225 hp. each. Later this same company put in a third diesel of 300 hp., and a small engine of 60 hp., which is used to provide power for lights and to furnish the heat necessary to keep water pipes from freezing over winter week-ends and holidays. It is now engaged in installing a fifth diesel of 300 hp.

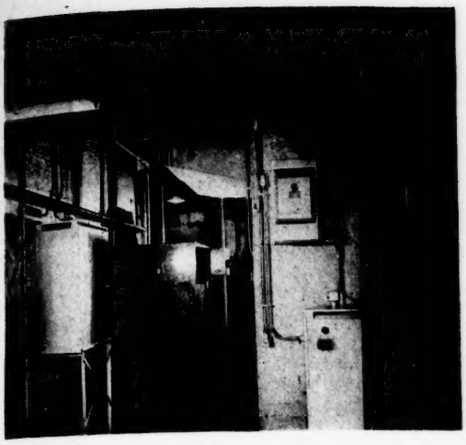
Equipment includes motor-driven fans and two sets of thermostatically-controlled louvres, one opening into the outside air and one into the plant. The daily conversion of nearly half the heat in the jacket water into heat for the company's plant has enabled the Rockford company to cut many thousands of dollars from the cost of heating its plant since installation of the first diesel three years ago.

Successful heating depends much upon the load factors and schedules, and in large factories large diesels are needed. But small ones operate with equal satisfaction in small plants and stores. At a Walgreen drug store in Chicago a 40-hp. diesel is used to furnish electric power for lights, signs, and electrical equipment, to supply hot water for the soda fountain, to operate air conditioning equipment in summer, and to heat the store during winter months. Possibly an even more interesting case of a diesel's employment in heating is to be found at a filling station of the Producers' Oil Company in Park Ridge (Chicago). Here a small, 20-hp., two-cylinder diesel is used to provide lights and power to operate air compressors, and to provide hot water for toilet and lavatory purposes and for washing cars in winter.

Numerous other uses than the provision of creature comforts have been found for the heat recovered from the cooling water. At the Minter City Oil Mill, Minter City, Ark., it is used for drying cotton. At the Corinth Brick Co., Corinth, Miss., the salvaged heat is used in the manufacture of brick. And at the Novelty Cafeteria, 93 Park Row, New York, surplus hot water, available after two diesels have provided warmth for diners at the luncheon hour, goes into a tank and is used for washing dishes.

Still another market has opened up among municipally-owned power plants, in small cities. Possibly the broadest use of diesels by a municipal power plant has been achieved at Hearne, Tex., where three 180-hp. engines in the municipal lighting plant not only provide power for the city and heat for the plant but furnish hot water for washrooms and heat for the city hall.

Electrostatic Air Cleaning System Installed in Field Building



Electrostatic air cleaners, power packs, and door switches in the Field Building, Chicago's tallest.

MORE than 100 Chicago business men and editors inspected on October 20 the new electric air cleaning system installed in the Field Building, Chicago. Following a luncheon, the principles of this method of cleaning were explained and demonstrated.

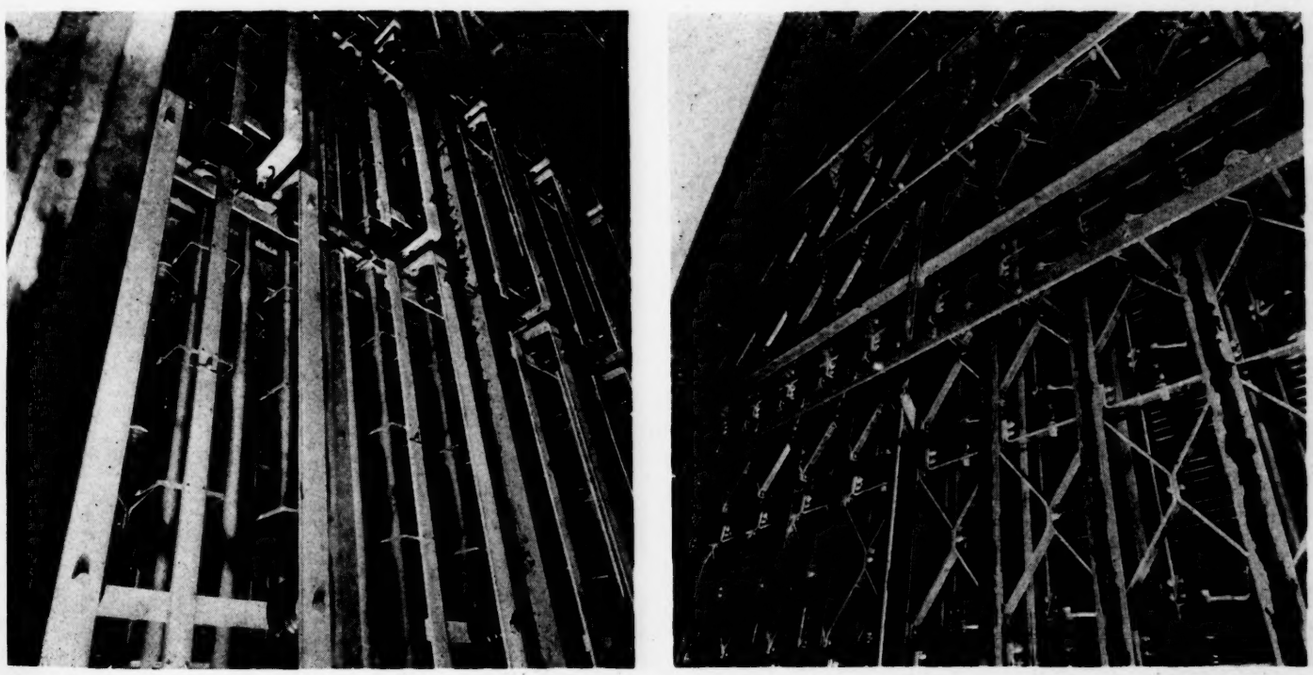
The electrostatic process in use in the Field Building removes up to 99%, by weight, of particles in the atmosphere, even those which are as small as four-millionths of an inch in diameter and almost sub-microscopic.

In the cleaning process the air is first bombarded by ions emitted by wires as fine as human hair and which carry a charge of 12,000 volts. The ions attach themselves to particles in the air thus giving the particles an electrical charge. Next the treated air is drawn through a series of cells consisting of alternately spaced high-potential and grounded plates. By charging the high-potential plates at 5000 volts an electrical field is established. As the treated air passes through these cells, the charged particles adhere to the plates and the air so freed of all solid matter passes on through ducts that lead to the areas being served by the equipment.

In the Field Building, first to have an electrostatic installation, 18 units have been installed which are capable of cleaning 272,000 c.f.m. In a year's time, it is estimated, the installations will have collected approximately 600 bushels of impurities. By weight, the collection will consist of one-third ash; another third fixed carbon, soot lampblack and other derivatives; and the remaining third volatile matter such as oils and greases. Sulphur, bacteria, pollen in season, and other substances found in suspension in the atmosphere of any city, are also deposited on the plates.

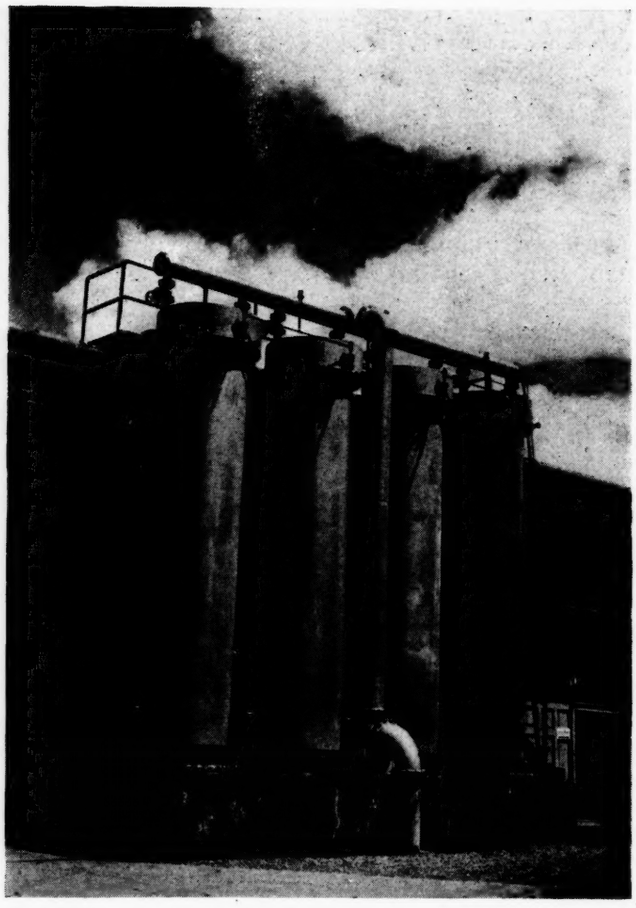
The average particle in cigarette smoke is approximately four-millionths of an inch in diameter. Billions of such tiny particles are emitted with each puff of smoke. If magnified 250,000 times, the larger particles which readily pass through 200-mesh screens would appear to be 50 ft. in diameter. An average sized dirt particle of the type which fills the atmosphere, at this magnification would appear to be as big as a baseball. However, enlarged to the same degree, the average sized smoke particle would be a little more than an inch in diameter or slightly smaller than a golf ball. The ability of the electrical air cleaner to remove particles of the smallest size from the air is said to be the solution to the dirt problem of city buildings.

Recently bacteriological tests were completed to determine the effectiveness of the cleaner as a means of removing certain organisms from the air. Water suspensions of two types of organisms were sprayed into the air in numbers that averaged 650,000,000 to each 1000 cubic centimeters, a volume of air roughly corresponding to one quart. This bacteria-filled air was then passed through the cleaner and when tested following the operation was found to average one micro-organism per quart of air.



Details of the Field Building installation. (Left) The dirty air enters this side of the 22,500 c.f.m. air cleaner which is composed of thirty 750 c.f.m. collection cells and (Right) ... clean air comes out this side.

Agfa Ansco Reduces Cooling Load with Well Water



Four large vertical ammonia condensers used for dissipating the heat picked up by the air conditioning system.

Approximately 2.8 million gallons of 52F well water are used daily to condition the air for the Agfa Ansco film plant in Binghamton, N. Y. This well water is used to supplement the mechanical refrigerating equipment so that only 500 tons of mechanical refrigeration are necessary to condition 77 billion cubic feet of air yearly. The well water system is entirely automatic in operation and can furnish 3 1/2 million gallons per day, or enough to meet the needs of a city of 40,000 population

A GOOD example of the use of well water to supplement and reduce the cooling load on refrigeration machines is furnished by the system installed in the Binghamton plant of the Agfa Ansco Corporation, manufacturer of photographic films, papers, and chemicals. This plant has approximately 821 tons of ammonia refrigeration, of which approximately 500 tons are used for air conditioning. The well water system of the plant is capable of supplying 3½ million gallons per day of 52F water or enough to meet the needs of a city of 40,000 people. Approximately 82% of this water is used for air conditioning purposes. The temperature varies only slightly throughout the entire year.

In all of the buildings but one the well water is used in conjunction with either chilled water sprays or direct expansion coils for air cooling. The new warehouse erected during the early part of this year, however, uses well water exclusively for air cooling. Under maximum conditions 300 gallons per minute are supplied to this building and it is estimated that this water has a refrigerating effect of 117 tons.

Well Water Supply System

There are four wells supplying water to the system at the present time. There is also another well under construction which is expected to have a capacity of 1500 gal.

Three of the four well pumps supply water directly to the general water supply system. The water from the fourth well, which supplies approximately 300 g.p.m., is used primarily for film production work since it is better suited to the film needs than the water from the other three wells. Excess water from this well is discharged into the general water system.

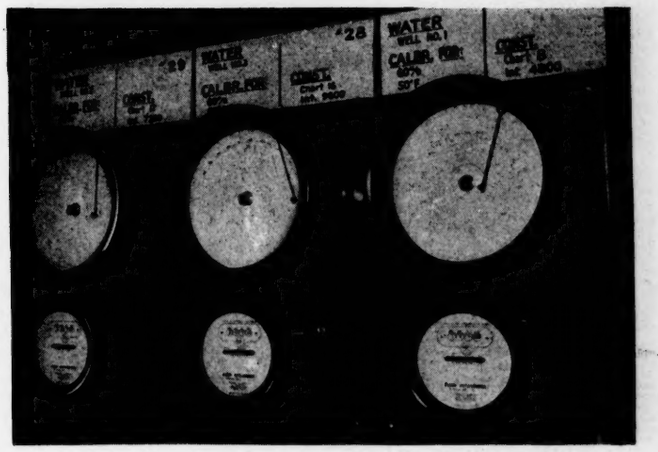
A constant pressure is maintained in the water lines by means of a 10,000-gal. equalization or surge tank located on the roof of an 8-story film production plant. This tank has its water level controlled by means of a float which is connected to a drum controller. The controller starts and stops the various pumps as the demand for water changes so as to keep the water level within 4 ft. The equalization tank also serves as a reserve supply in case of short periods of current failure.

There are seven possible combinations of the pumps, with the capacities of the combinations ranging from 350 to 2500 g.p.m. The combination of pumps in use at any particular instant is determined by the level of the water in the surge tank.

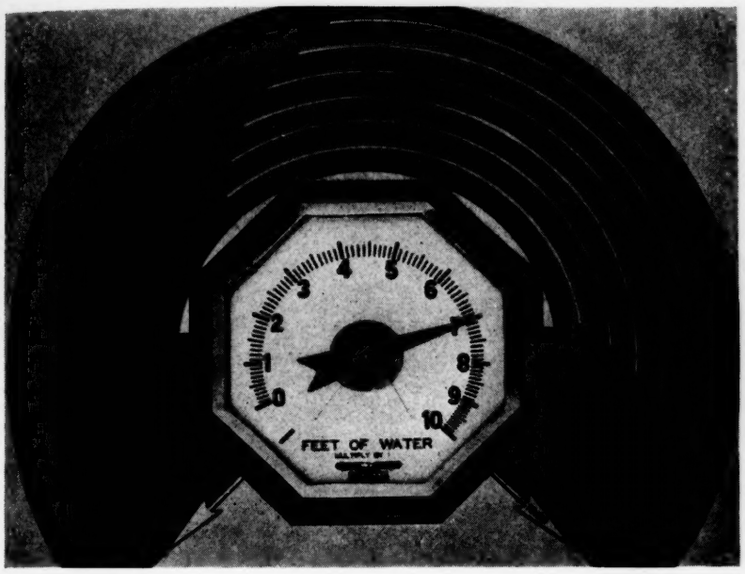
The pumps themselves are the deep well type with wrought iron suction pipes and red brass intake screens. These screens extend from the bottom of the well up about 20 ft., depending upon the ground strata conditions. The depths of the wells range from 80 to 100 ft.

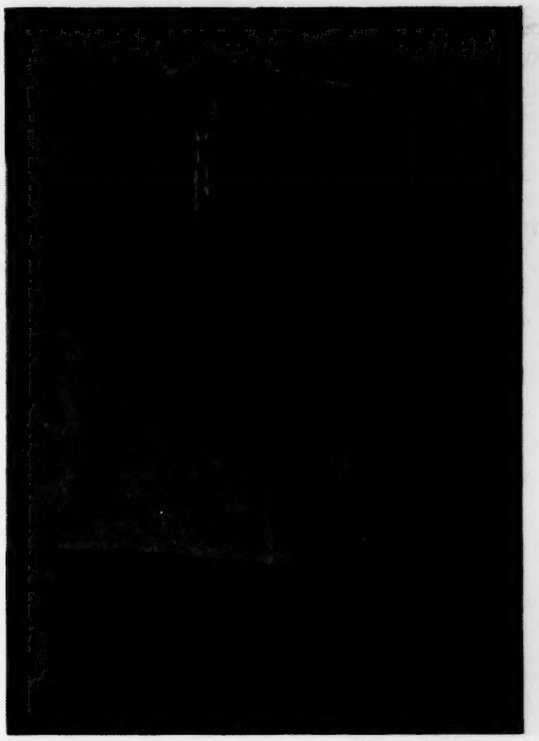
All of the pumps are encased in pump houses which have foundations of poured cement and walls of cement blocks. Because of the danger from floods the pump houses and pump motors are in all cases located above the flood level.

In one of the pump houses is located the switch and

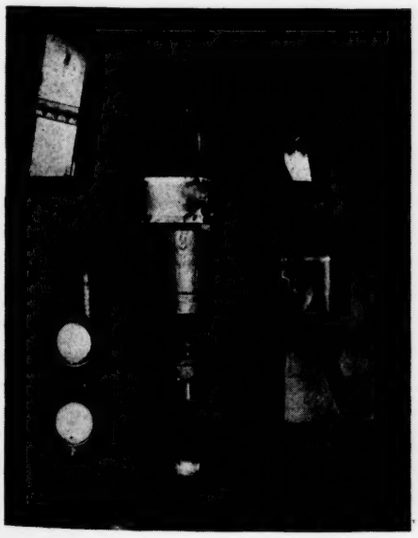


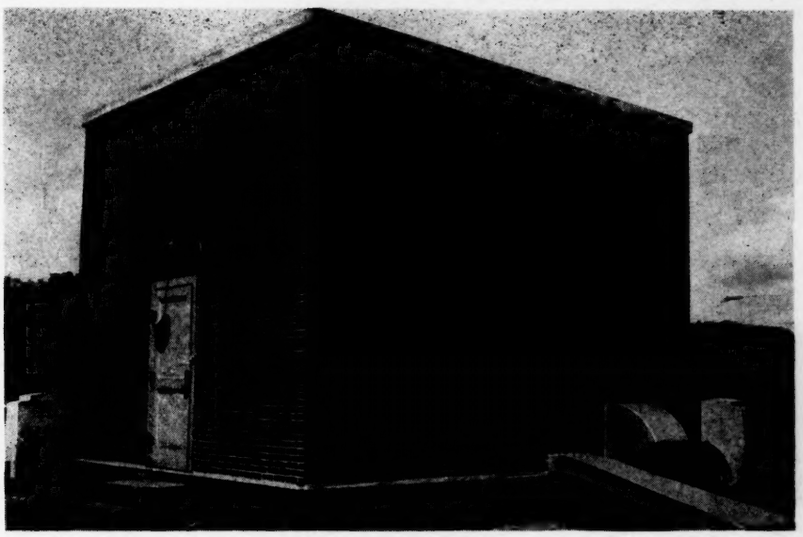
(Left) Concrete block house which encloses both the deep well pump for No. 3 well and the control equipment for entire well water supply system. (Right) Recording flow meters for wells Nos. 1, 2, and 3.





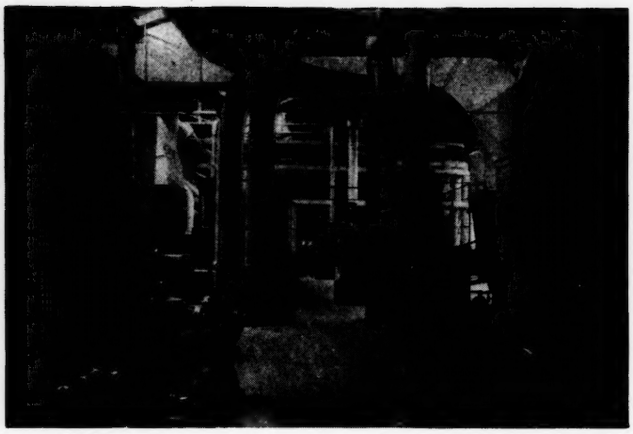
(Above) Equalizing tank level indicator. Outer circle indicates operation of pumps. (Right) Interior view of equalizing tank. Ball float and drum controller shown in the center.

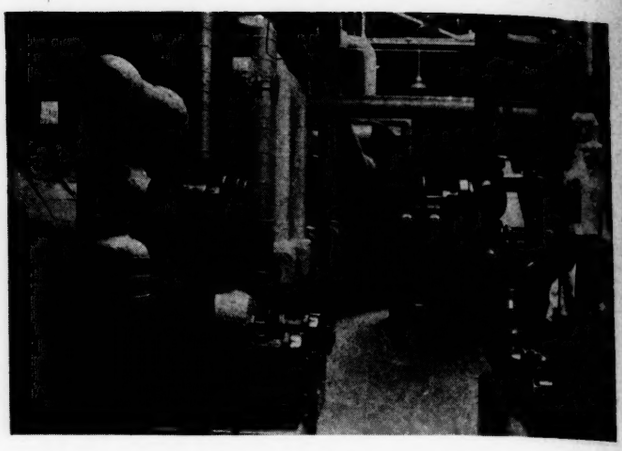




(Left) One of the deep well pumps.

(Right) Brick penthouse which encloses the equalizing tank.





(Left) Air conditioning equipment looking towards the refrigeration room. On each side is shown an air washer; circulating pumps in the foreground. (Right) One of the chilled water generators which supplies cold water to the air washers. Note heavy insulation on all chilled water and refrigerant lines.

instrument boards which control the operation of the water supply system. Among the instruments are a recording level meter to show the water level in the surge tank, recording flow meters to show discharge of each pump, and ammeters to show current consumption of all pump motors.

Use of Well Water in Paper Coating

In the paper coating building the well water is used to wash and precool the air before it is chilled by direct expansion ammonia coils. These direct expansion coils are used to secure the low relative humidity and temperature necessary in the manufacture of photographic paper. The coils have been in use for approximately 25 years and have given satisfactory service for the entire period. They are so constructed that there are no joints within the duct itself, thus minimizing the danger of ammonia leaks.

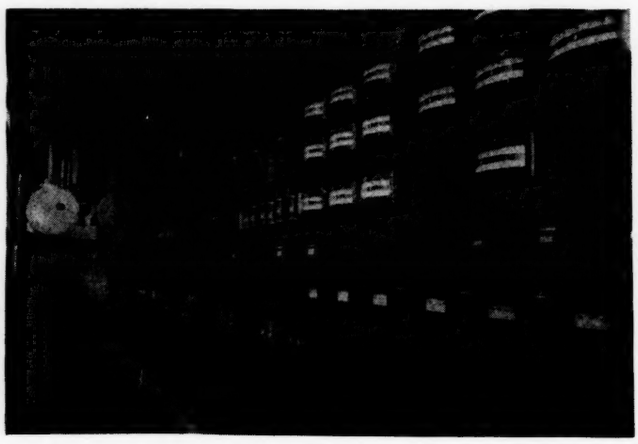
After leaving the coils the air passes through air filters. The temperature of the air entering the rooms is about 50F.

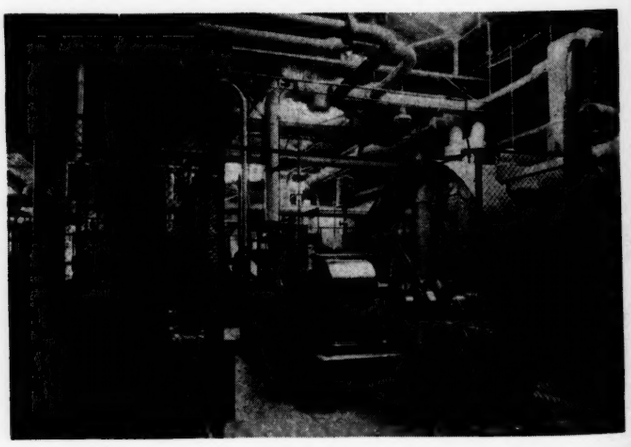
There are three other conditioning units in the paper coating building, two of which supply clean air under ordinary comfort conditions and one which supplies air for paper drying. The two comfort systems use straight well water in one bank of sprays and recirculated well water in the other bank. Air is discharged from these units at about 70F. The other washer supplies air to the paper coating department and drying rooms and uses three sprays, the first spraying recirculated well water, the second well water and the third chilled water at 40F. After leaving the sprays the air is reheated to whatever temperature is desired in the drying room. All of these washers are 25 or more years old and all of them are still performing satisfactorily.

Film Production

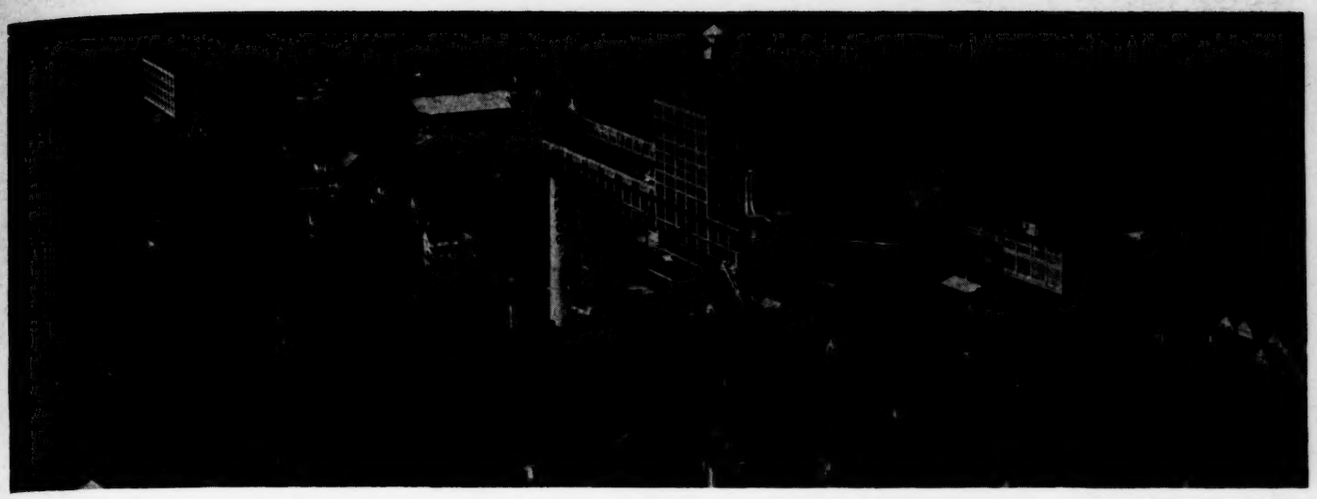
The use of well water in conditioning the air for the film production is quite interesting. In this application all of the well water is used three times before it is discharged to the sewer.

There are six air washers serving the film production building, each washer serving a separate section and maintaining a different condition. In all washers well water is used for precooling the air. The flow of the well water is as follows: Direct well water is supplied to the second bank of sprays in each unit. It is then discharged to a 150,000-gal. underground reservoir. Recirculating pumps withdraw the water from the reservoir and send it to the first spray in each washer. On being discharged from this spray the water again flows to the underground reservoir and another pump withdraws it and forces it to four large outdoor ammonia condensers. From these the water is





(Left) Control and instrument board for regulating the operation of the air conditioning and refrigeration system. (Right) A section of the refrigeration plant showing one of the large horizontal double acting compressors.



Air view of a section of the Agfa Ansco plant, Binghamton, N. Y.

discharged to the sewer. Any excess water in the underground reservoir is allowed to flow through an overflow pipe to the sewer. All water which is withdrawn from the reservoir is chlorinated to destroy the algae which tend to grow in the water and clog the spray nozzles and condensers.

A number of the areas in the film production plant require a lower dewpoint than can be obtained with well water. Therefore the air washers serving these sections have a third spray section for chilled water. Chilled water is furnished by ammonia compressor units with capacities of 125, 155, 170, and 270 tons of refrigeration, respectively.

These compressor units are of the horizontal double acting type. They are all belt driven by 2300-volt synchronous motors. The liquid ammonia from the condensers is expanded in flooded water coolers in which the back pressure is maintained manually. Water is discharged from these coolers at temperatures ranging from 40 to 55F depending on the air washer demands.

The compressed ammonia vapor is liquefied in four large shell tube and vertical condensers which stand on the outside of the building. As previously mentioned, these condensers are cooled by water from the 150,000-gal. underground reservoir.

In one case in the film production plant two washers serving separate areas and maintaining different conditions have chilled water supplied by the same cooler. In order to take care of these two demands the cooler is so controlled that it will supply chilled water at the same temperature to both washers. The temperature of the water is determined by the washer which is calling for the lowest temperature. The other washer then throttles the supply of chilled water to obtain its proper temperature.

Operating Notes

One of the most important functions of the air conditioning equipment in this plant is to supply clean air at all times. In a number of cases the air is not only washed three times but also filtered twice. In such systems the air first passes through an oil treated filter, then through three spray banks in the air washers, and then through a felt filter. In order to determine when the filters need cleaning resistance readings are taken every hour. When the resistance increases to a given point the filters are changed. Dust counts are also made from time to time to check the efficiency of the filters. The oil type filters are cleaned and re-oiled every month.

The instruments on all the conditioning equipment are read hourly and the readings entered in an operating log. Refrigerating tonnage and operating costs are calculated daily.

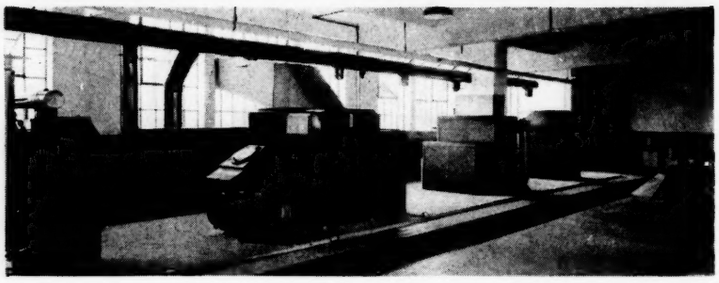
Maintaining Condenser Efficiency by Comparing Temperature Rises

WHEREVER condensers are used for the removal of heat, it is a point in good practice to have all units alike, or as nearly so as possible, in order that there may be available the opportunity for a comparative check in operation. Let us say that we have a number of stands of condenser piping doing similar service, and all stands are alike. It follows that the condenser water in all stands which are operating properly will have a temperature rise that will compare very closely.

It follows, that if the temperature of the water entering and that going off has a lesser differential in one unit than is common for the others, it is automatically indicated that something is clogged or that something else is wrong. Such checking will allow one to see the development of trouble, so that it need not go on unnecessarily, with consequent losses. The temperature rise of condenser water is the surest indicator of efficient service that may be had, for anything that affects efficient service is going to affect the temperature rise.

PICTURE PARAGRAPHS

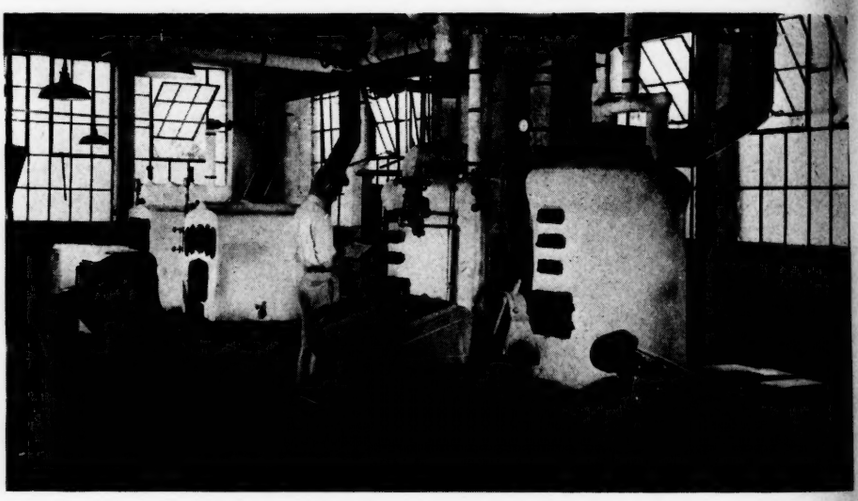
The modern Anthracite Industries Laboratory at Primos, Pa.



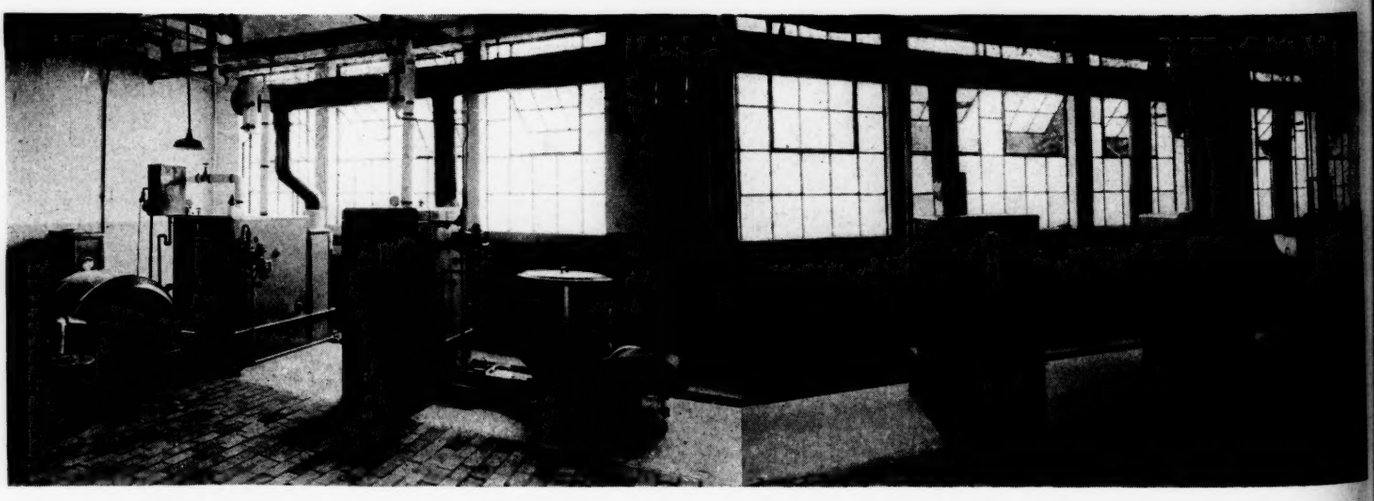
Second floor of the laboratory showing several air conditioning units on test.

AN INDUSTRY IS REBORN . . .

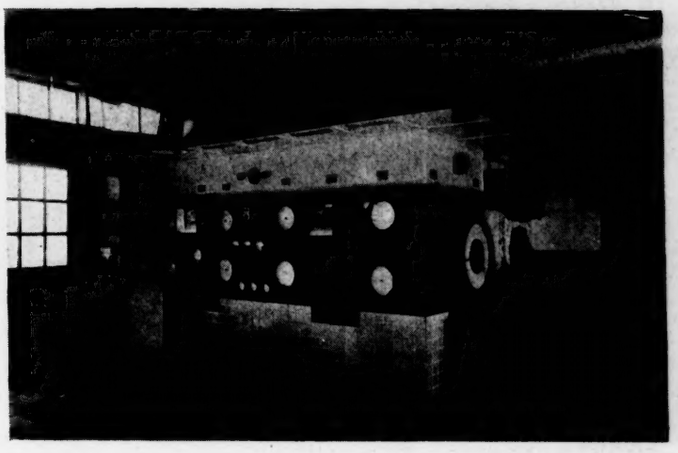
. . . and the views here are of the birthplace—the Anthracite Industries Laboratory. Under the capable leadership of Director Allen J. Johnson and a well organized staff, the Laboratory has over a period of years developed new equipment, ironed out kinks in conventional equipment for the burning of anthracite, and otherwise assisted in placing efficient anthracite-consuming devices on the market for the public. If equipment passes impartial and thorough laboratory tests and field trials it receives the Laboratory's Seal of Approval



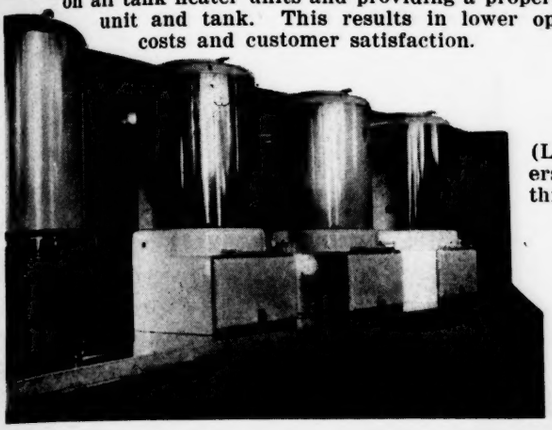
A test being run on a round boiler and stoker.



Tank heaters on test. Progress has been made in recent months by including an automatic temperature regulator on all tank heater units and providing a properly sized unit and tank. This results in lower operating costs and customer satisfaction.

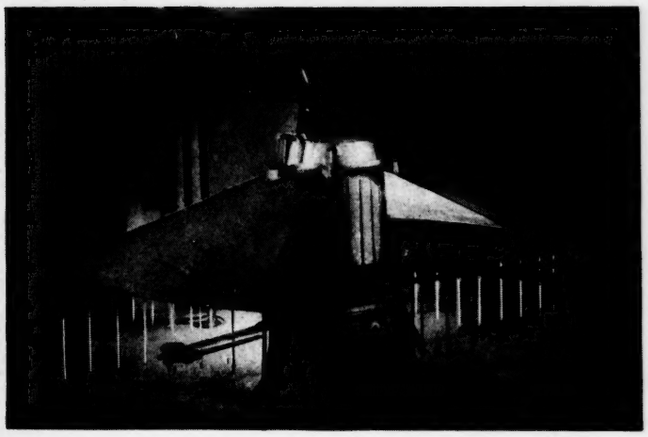


The ingeniously arranged and complete automatic instrument board where are recorded all furnace operations of such a nature as temperature, gas analysis, etc. Use of this board eliminates necessity for recorders around the apparatus being tested and also saves the time of the testing engineer.



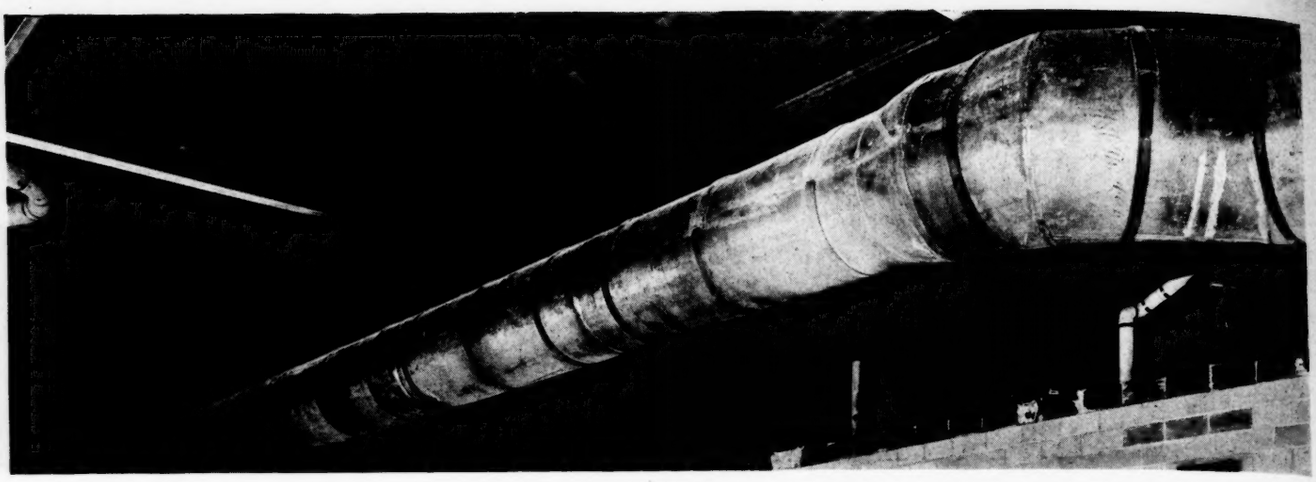
(Left) A line of new boilers developed by the Anthracite Industries Laboratory.

(Below) Test arrangement for a brooder stove for small chickens.



Analyzing the flue gas in a typical testing routine.

The four views shown to the left make up a nearly perfect panorama of the first floor. At the extreme right are non-jacketed boilers used to test conversion equipment, while the smaller view to the left shows a line of modern anthracite boilers arranged for stoker-firing, hand-firing, and magazine feed.



Main duct forming central exhaust pipe. Closeup below shows how it was made from sheets of lead curved to shape.

Lead Ducts for Laboratory Ventilating System

Several of the vertical ducts with the external horizontal steel reinforcing bars. Straps attaching ducts to I-beam above are only temporary.

INSTALLATION of an all-lead ventilating system in the new chemistry building of the University of Delaware, Newark, Del., is an example of a practical application of this material, for which it is claimed that its resistance to corrosive acids and gases, pliability, low cost, and high salvage value make it ideal for such uses.

The University of Delaware's ventilating system consists of a series of ducts, concealed in the walls and partitions of the building and leading to a central exhaust system on the top floor. Fumes and gases are drawn out through registers near the floors and ceilings and through hoods attached to the laboratory equipment. Five exhaust fans are used when the system is in operation.

All ducts, including the large circular duct forming the central exhaust system, were made from antimonial sheet lead, supplied by National Lead Company. The lead weighed from four to six pounds per square foot. All joints in the system were "burned" rather than soldered to make sure that nothing but pure lead would be exposed to the attack of the corrosive fumes.

The photographs show the ducts shortly after erection and illustrate the methods used to reinforce and support them.

The vertical ducts, of which there are 52, are rectangular in shape and vary in size from 6 in. x 8 in. to 10 in. x 48 in. They are reinforced with horizontal steel bars, lead-covered. The bars protrude a short distance from the outside of the duct and form a support after the partitioning has been erected. In the photograph, the straps shown passing over the I-beam are merely temporary supports.

The large circular duct is the central exhaust pipe. It is formed from sheet lead and varies from 24 in. to 36 in. in diameter. It is encircled at 36 in. intervals by 3 in. iron bands which serve both to brace and to hold it. Strips of lead, burned over the upper half of the bands, are a special support for the upper half of the pipe, and prevent it from sagging inward due to its own weight.

The ventilating system was designed by Robert P. Schoenijahn, consulting engineer, Wilmington, Del., and installed by E. G. Bihn, lead construction contractor, Camden, N. J. Wm. D. Shellady, Inc., Wilmington, was the general contractor. Chas. Z. Klauder of Philadelphia was the architect.

Date Heating Season Ends in a Normal Year

If solar heat were the only factor governing the change of seasons, the heating season would end simultaneously along equal latitude lines. The accompanying map shows that this is somewhat the case in the Eastern half of the United States but is not strictly true in any part of the country, due chiefly to variations caused by differences in altitude and proximity to large bodies of water.

Setting the Limiting Dates

The beginning and ending dates of the heating season can be determined by a method which assumes that the conception of the degree-day is correct. Use of the degree-day implies that the quantity of heat necessary for the heating of buildings (to 70F) is proportional to the number of degree-days on a 65F base. The corollary of this statement is that no heat is necessary when the outside temperature for the day is 65F or above. Conversely, heat is necessary when the mean temperature falls below 65F.

Obviously heating plants even in the same town are placed in or taken out of operation at varying times, depending on the habits, feelings and customs of the occupants of each building. Consequently, to arrive at definite dates for the heating season, we can assume that the plant is automatic and will begin to function on the day that the mean temperature falls below 65F and will go out of service on a day when the mean temperature rises above 65F.

Midsummer Not at Summer Solstice

The hottest and coldest months do not coincide with the months having the longest and shortest days with consequent greatest and least insolation. Thus the middle of the summer does not fall on June 21 but approximately late in July and early in August. The heating season in a particular year would begin on the first day after (say) August 1 when the daily mean temperature falls below 65F. The season would end in a given year on the last day before August 1 when the daily mean temperature is below 65F.

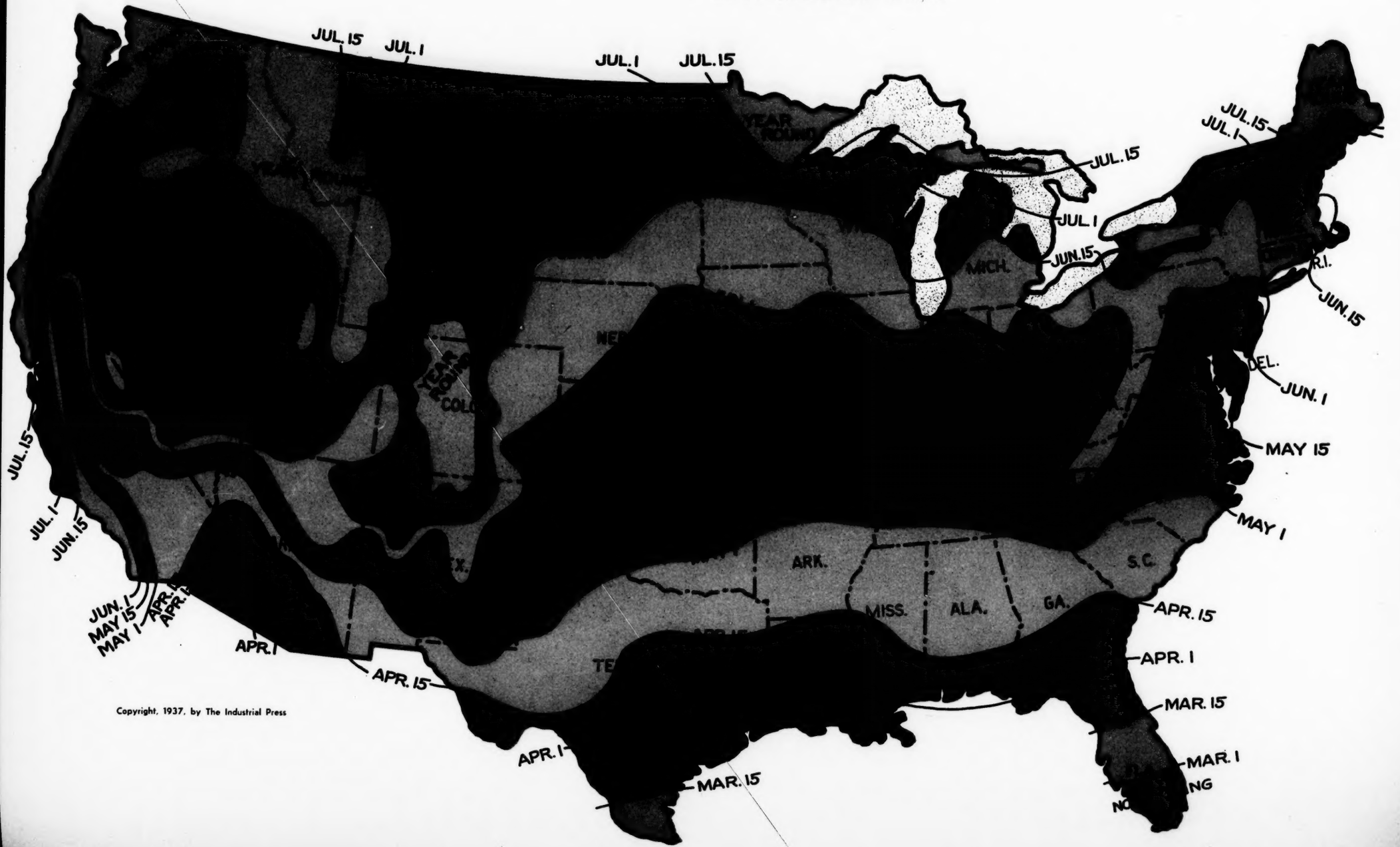
Variability of Season End Date

By the definition we have set up, the heating season begins and ends at different times in different years in the same city. Since there are occasional "freak" days when the mean daily temperature falls to or slightly below 65F even in mid-summer, a fair indication of the actual beginning or ending date of the season is the earliest or latest period when three successive days have mean temperatures 65F or below. On this basis, for example, Hartford, Conn., had ending dates in one four-year period as follows:

1934.....	June 7- 9
1935.....	June 18-20
1936.....	June 22-24
1937.....	May 20-22

Text continues following Map and Table.

DATE HEATING SEASON ENDS IN A NORMAL YEAR



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DATE HEATING SEASON ENDS IN A NORMAL YEAR IN 100 CITIES

City	Season Ends
Albany, New York	June 3
Albuquerque, New Mexico	May 19
Atlanta, Georgia	April 28
Baltimore, Maryland	May 27
Birmingham, Alabama	April 21
Boise, Idaho	June 14
Boston, Massachusetts	June 9
Buffalo, New York	June 16
Burlington, Vermont	June 12
Butte, Montana	Year Round
Charleston, South Carolina	April 17
Charlotte, North Carolina	May 1
Cheyenne, Wyoming	July 2
Chicago, Illinois	June 4
Cincinnati, Ohio	May 21
Cleveland, Ohio	June 6
Columbia, South Carolina	April 21
Columbus, Ohio	May 24
Concord, New Hampshire	June 23
Dallas, Texas	April 16
Denver, Colorado	June 10
Des Moines, Iowa	May 27
Detroit, Michigan	June 6
Duluth, Minnesota	Year Round
El Paso, Texas	April 21
Erie, Pennsylvania	June 9
Eugene, Oregon	July 12
Evansville, Indiana	May 10
Fitchburg, Massachusetts	June 16
Flagstaff, Arizona	July 14
Fort Smith, Arkansas	April 27
Fort Wayne, Indiana	May 29
Frederick, Maryland	May 20
Grand Forks, North Dakota	June 23
Grand Rapids, Michigan	June 5
Great Falls, Montana	June 28
Greensboro, North Carolina	May 5
Hartford, Connecticut	June 7
Houston, Texas	March 23
Huntington, West Virginia	May 16
Indianapolis, Indiana	May 22
Jacksonville, Florida	March 28
Kansas City, Missouri	May 16
Knoxville, Tennessee	May 7
Lexington, Kentucky	May 17
Lincoln, Nebraska	May 25
Little Rock, Arkansas	April 26
Los Angeles, California	June 5
Louisville, Kentucky	May 10
Madison, Wisconsin	June 7
Memphis, Tennessee	April 25
Meridian, Mississippi	April 20
Milwaukee, Wisconsin	June 18
Minneapolis, Minnesota	June 7
Minot, North Dakota	June 25
Mobile, Alabama	April 10
Newark, New Jersey	May 26
New Orleans, Louisiana	March 27
New York, New York	May 30
Norfolk, Virginia	May 11
Oklahoma City, Oklahoma	May 5
Omaha, Nebraska	May 23
Paterson, New Jersey	May 27
Pensacola, Florida	April 7
Peoria, Illinois	May 27
Philadelphia, Pennsylvania	May 22
Phoenix, Arizona	April 6
Pittsburgh, Pennsylvania	May 23
Portland, Maine	June 24
Portland, Oregon	June 30
Providence, Rhode Island	June 13
Pueblo, Colorado	June 3
Reading, Pennsylvania	May 25
Reno, Nevada	June 26
Richmond, Virginia	May 10
Rochester, New York	June 10
St. Louis, Missouri	May 9
Salt Lake City, Utah	June 8
San Antonio, Texas	March 25
San Diego, California	June 24
San Francisco, California	Year Round
Savannah, Georgia	April 10
Scranton, Pennsylvania	June 3
Seattle, Washington	Year Round
Shreveport, Louisiana	April 12
Sioux City, Iowa	May 29
Sioux Falls, South Dakota	June 6
South Bend, Indiana	May 30
Spokane, Washington	June 23
Springfield, Illinois	May 21
Syracuse, New York	June 4
Topeka, Kansas	May 18
Trenton, New Jersey	May 24
Tulsa, Oklahoma	May 6
Vicksburg, Mississippi	April 12
Washington, District of Columbia	May 19
Wheeling, West Virginia	May 21
Wichita, Kansas	May 15
Wilmington, Delaware	May 20
Yuma, Arizona	March 20

We see that the heating season ending date in four years varied as much as 33 days.

What the Map is Based On

Since the engineer is often interested in average figures rather than those for specific years, an average date for the ending of the heating season can be selected as that date when the normal mean daily temperature rises above 65F. It is this date that is plotted in the accompanying map, with figures for the large cities shown in the table.

In the map we find that Hartford has a season ending date of about June 7; this is quite close to the average of the four-year record above, June 11.

Regions marked "Year Round" on the map are those when the normal daily mean temperature never rises above 65F. As a matter of practical application, this indicates that the automatic heating plant operating (if it were possible to do so) only when the daily mean temperature falls below 65F would be liable to be called into use any day throughout the year. It does not mean that the plant actually does operate every day of each year.

Where Season Never Ends

However, the season in such regions does closely approach a Year Round one; for example, in Eastport, Maine, there were only 3 days in 1934 after August 1 when the mean daily temperature was 65F or over; in 1935 prior to August 1 there were 9 such days. Consequently, the heating season of 1934-35 in Eastport lacked only 12 days of being Year Round. In 1935-36 the season lacked 15 days of being Year Round.

The Year Round region on the Pacific Coast presents a somewhat different picture. For example, in San Francisco the normal mean daily temperature reaches a maximum of 61.4F, and this maximum is reached late in September and early in October, so that mid-summer in that city is two months later than in the East. A count of days in one heating season (1933-34) showed only 33 days with a mean daily temperature above 65F.

High Daily Range on West Coast

However, in this particular part of the country the daily range of temperature is high. Practically all of the 33 days referred to had a daily range of 20 to 30F. With such a range, the day temperature can be actually hot with cool enough nights so that the mean temperature is low enough to be misleading to those familiar only with the climates in the East. It is extremely doubtful if in such a climate the degree-day conception is wholly applicable.

However, San Francisco is probably the most exceptional in this respect of the more than 400 cities plotted. In general the Year Round region should be considered as one where the heating season approaches 365 days in length.

Air Conditioning in a Candy Factory

By L. P. LEATHERS† and F. A. WESTBROOK

An outline of requirements for air conditioning in candy factories together with a brief description of the air conditioning system in one of the largest candy plants in the country.

THERE are many different kinds of candies, made of different materials and in various ways and put through many processes. The quality of the products, as well as the economy of production, is greatly affected by the air, particularly with respect to its temperature and the amount of moisture present. Moreover, these elements need to be varied for the different products and processes, so that in an up-to-date candy plant it is necessary to provide differently conditioned air for different departments.

Creams

The creams, which are usually later coated with chocolate, are cast in molds made of corn starch in which impressions are made by a machine. These are known as "centers" and are set by cooling. If excess humidity were present in the room where they are cooled and set, or in the room where they are cast, the corn starch would absorb moisture and become soggy. If the corn starch were soggy it would be difficult to clean the pieces when they are removed from it.

After the centers have been removed from the molds they are either placed in storage for a time, or taken to the chocolate dipping room. In either case if the centers are exposed to too much humidity before dipping they will absorb moisture on their surfaces which will break down the structure of the piece and make it mushy. Therefore, it is necessary to maintain the proper humidity and temperature in the casting room, setting room, storage and dipping room. As sanitation is stressed it is considered necessary to wash the air, which of course also cools it.

†Plant Engineer, W. F. Schrafft and Sons, Boston.

Hard Candy

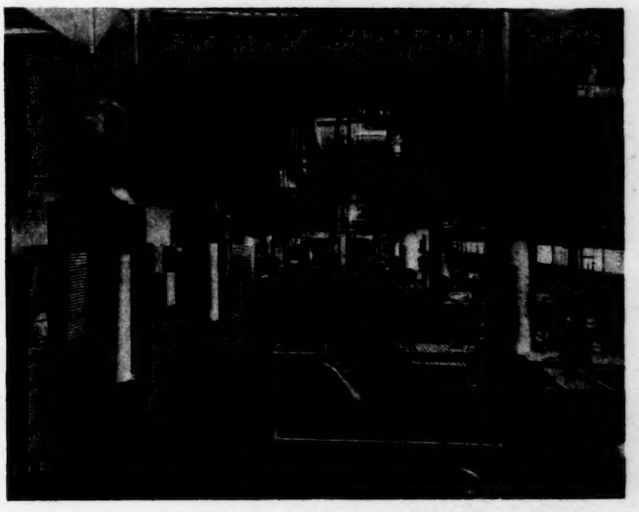
Hard candy usually has a glossy finish and, beginning with the spinning or forming operation, is very susceptible to moisture. It therefore requires a much lower degree of humidity than the cast centers. However, if the humidity is too low the handling and packing of this product becomes difficult because the glossy surface tends to "dusting," or minute chipping, which spoils the finish. Consequently, the moisture content of the air in the rooms where hard candy is handled must be controlled within relatively close limits.

Dipping

Where chocolate dipping is carried on by machinery it is customary to maintain a fairly high temperature to keep the chocolate soft and facilitate operation of the machines. The dipped pieces are then cooled and hardened in a separate room, although some manufacturers use cooling boxes located in the dipping room. In either case the humidity does not make much difference in the setting of the chocolate, but the temperature and air movement are important factors.

Caramels

There are other kinds of candy such as caramels, nougatines, etc., which are cooked and partially formed



Two views of Schrafft's candy factory. (Left) One of the supply ducts for the chocolate hand dipping department is shown at the right; the other large duct is the common return for this and another department. (Right) Main ducts and air supply louvers for the center coating room. Ducts in the upper portion of the picture with the rectangular openings are returns.

in rooms where it would be very difficult to maintain a low humidity on account of the steam given off in the cooking operations. This material is therefore cooked and panned in one room. Then, because it is susceptible to the absorption of moisture, it is rolled to the proper thickness, cut and stored, in rooms in which the air has been conditioned as required for this product.

The Schrafft Plant

Manufacturing departments have been divided into three groups for air conditioning, with three different fixed dewpoints which will give the conditions required. Humidity is controlled by the dewpoint method.

In most processes in a candy factory the moisture gain from process workers and apparatus is generally very small compared to the amount of refrigeration required. Consequently, where the conditioning system supplies all of the refrigeration it is possible to use air volume control with a fixed dewpoint at the air conditioner machine.

With this system the room thermostat controls the inlet dampers in the main air ducts and supplies saturated air at the pre-determined dewpoint in sufficient quantity to take care of the heat gain. If the quantity of air admitted under these conditions is not sufficient to give the desired air movement, additional circulation is set up by independent booster fans in the duct system.

As there are three groups of departments, each calling for different dewpoints, three separate air conditioning units have been installed, which furnish saturated air at these three dewpoints. The dewpoint for each group is determined by the temperature and humidity required for the processes carried on in each group. For example, if it is desired to keep one department at 70F and about 37% relative humidity, another at 65F and 45% relative humidity, and a third at 60F and 52% relative humidity they have a common dewpoint at 42. Thus one air conditioning unit furnishing air at 42F, and saturated, will condition all these rooms satisfactorily. This is on the assumption that the moisture gain in those rooms is small, usually the case. However, if it happens that the moisture gain is high enough to affect appreciably the local dewpoint the air conditioning apparatus can be run at a lower dewpoint. Where the storage of finished goods is concerned direct radiating surfaces are satisfactory with small fans effectively located to give a small amount of circulation.

The refrigeration equipment is located in the power house. The refrigerating medium, water at about 36F, is supplied to the centrally located air conditioning machines. There is a main pumping system for this and circulating pipes to and from the power plant, with individual pumps at each conditioning unit to maintain a constant pressure at the spray nozzles. These three machines are located in a common apparatus room. This location has been determined with respect to the manufacturing space as a whole, as it has not been possible to group all those departments with the same dewpoint adjacent to each other.

The total quantity of conditioned air supplied to the manufacturing departments is 250,000 c.f.m. and the amount of refrigeration needed at maximum heat load is about 400 tons. In general the ducts are of a size to keep the velocity down to 1000 f.p.m., or lower, in order to prevent noise and to reduce friction losses. There are supply and return ducts between each room and the apparatus room. Thus there is a great deal more duct work than would be necessary for an office building, for instance, where extensive runs of main ducts with branches are possible.

The ejector system is used in those rooms which call for boosting of the circulation, such as some of the process rooms. As this air conditioning installation was made when the building was erected, parts of the main duct supply and return lines are of masonry built into the building, and all the equipment has been built in in one way or another.

Temperature of Burning Buildings

SOME time ago the problem was presented to an engineer to compute the correct size of safety valve for use on a pressure vessel containing liquid so that, in the event of a fire, the valve would be large enough to discharge the entire contents of the vessel within a given time. An explosion would thereby be prevented.

The engineer wrote a note to the consultant of the company and asked, "How hot does it get in buildings while they are burning down?," all of which the consultant immediately characterized as a "fool question."

However, it was not and is not a fool question. Knowing the outside temperature, knowing the quantity of liquid in the vessel, and knowing the area of heating surface, it is possible to arrive at a close figure for the rate of generation of ammonia gas, methyl chloride, carbon dioxide, steam, etc., under that temperature, and thus the size of safety valve is rationally determined. The gas can escape without causing dangerous pressure.

The consultant finally had to admit that, after all, it was a sensible question, and he was also obliged to admit that he didn't know.

Whereupon the engineer decided that he would find out. He went to many sources of information. After much searching he learned from a large manufacturer of fireproof safes that the average temperature of burning buildings is 1700F. The safemakers arrived at this figure by noting that where there is any brass in the building the brass either is not melted, or, it is just on the verge of melting. Brass melts at 1700F.

INDUSTRIAL EXHAUST VENTILATION

Typical Exhaust Hoods

By JOHN L. ALDEN

THE design of an exhaust system would be simplified greatly if standardized hoods of known characteristics could be selected from catalogs or their dimensions taken from published tables. The variety of types and makes of machines and the wide difference in character of work performed on a single machine precludes any substantial degree of standardization. Of necessity, the great majority of hoods are custom-built. Even such simple work as hand grinding involves such an assortment of large and small, awkward and simple work pieces that no single hood is universally applicable.

The hoods shown in the accompanying illustrations represent good practice under ordinary conditions. They are useful only as general guides and the engineer should not hesitate to depart from them when there is good reason for doing so. At times it will be necessary to alter the design so radically as to impair the hood efficiency unless the suction is increased. No criticism can be offered as long as an intelligent balance is reached between power cost and operating convenience. The engineer must keep in mind the basic principles of hood design as outlined in the preceding section and should work from fundamentals rather than follow blindly the author's illustrations.

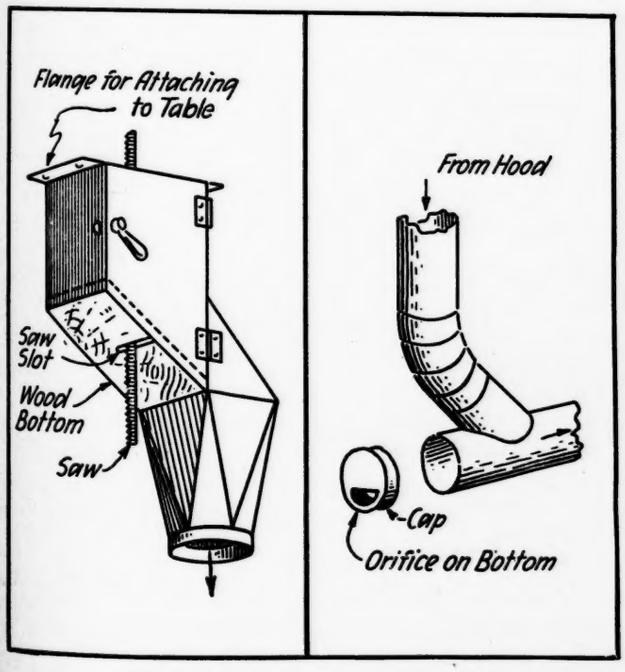
Hoods for Abrasive Processes

Well-designed hoods for abrasive processes in the metal-working industry are described in detail in the Tentative Code of Recommended Practices for Grinding, Polishing and Buffing Equipment Sanitation, American Foundrymen's Association, Preprint 36-38, December 4, 1936. For space reasons, therefore, such hoods will not be discussed here.

Hoods for Woodworking Machinery

Woodworking exhaust systems are installed for waste removal purposes rather than for health protection. The emphasis is on the removal of large quantities of coarse materials rather than on the entrapment of microscopic particles. In consequence, most of the woodworking hoods illustrated are shaped to conform to the trajectories of flying chips. They depend for their success upon effective shape and placement with respect to chip trajectories rather than upon velocities external to the hood mouth.

Each hood must be provided with an adequate air inlet. While woodworking hoods should fit tightly in non-working areas, sufficient air must be admitted to transport the chips. The air inlet area seldom should be less than twice the branch pipe area. As a general



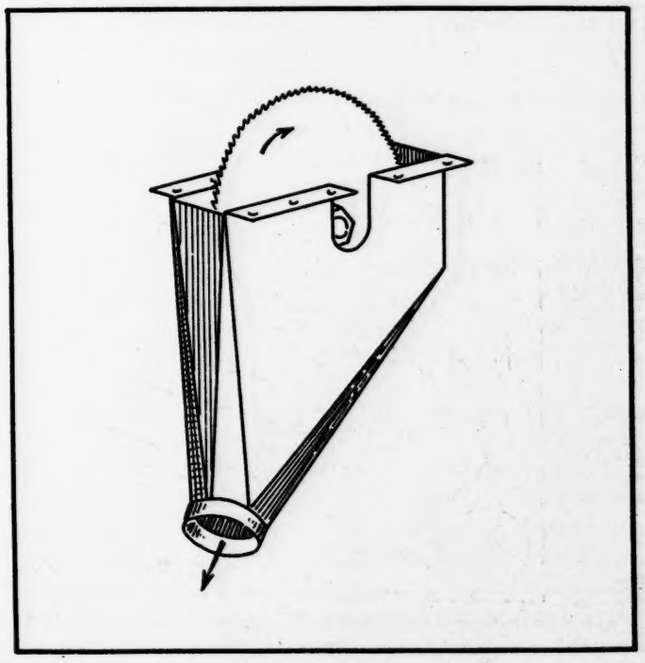


Fig. 17. (Left) Band saw hood. Fig. 18. (Center) Hood connection to branch with secondary air inlet. Fig. 19. (Right) Table saw hood.

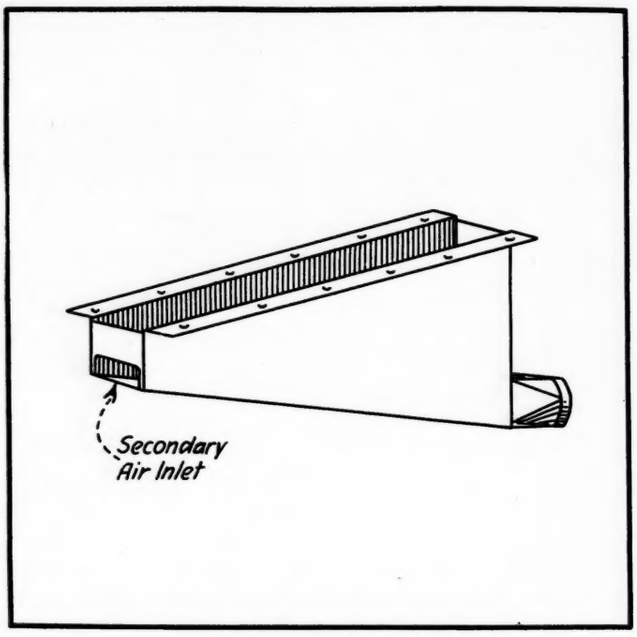


Fig. 20. Swing saw hood.

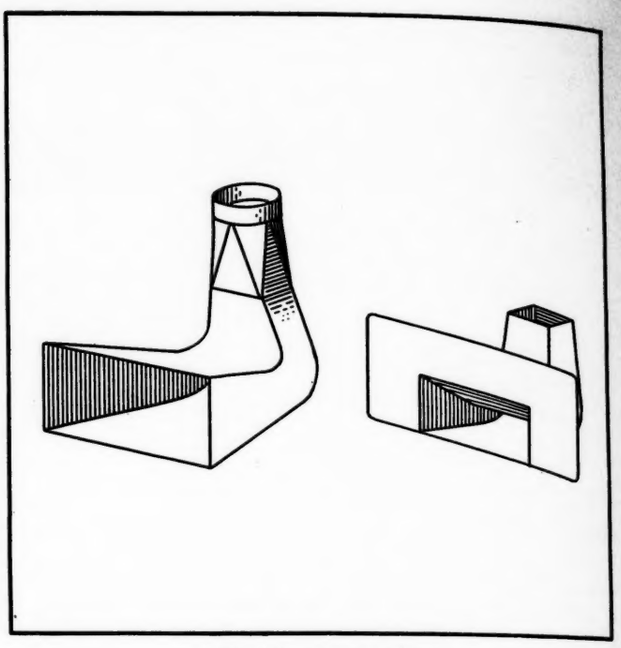


Fig. 21. Shaper hood.

rule, it should be so located that the air stream will pass through the dust generating zone in the direction of chip travel.

No hood receives more severe usage than the average woodworking hood. Heavy construction and generous reinforcement are essential. Doors, telescoping members and sliding parts should be made of No. 16 gage steel or heavier. Battered hoods fail to fit properly; are ineffective; are difficult to adjust, and are an annoyance to the workman.

Saw Hoods

Fig. 17 is a typical band saw hood. The hardwood sloping bottom is slotted for passage of the saw. All saw hoods must admit sufficient air through the table slot and other openings and by leakage around the door to provide branch pipe velocities sufficient to convey the sawdust after it is thrown into the pipe. Secondary air may be admitted to the floor-level branch as in Fig. 18. The dead end of the branch is closed by a removable cleanout cap having an inlet orifice enlarged to a size just sufficient to prevent clogging. The orifice is aligned with the bottom of the pipe so that the entering air will sweep the bottom clean.

Large self-feed saws and band resaws are usually equipped with two suction pipes, one on the down-run of the saw and the other at the lower rear portion of a housing completely covering the lower band wheel. The first hood removes the bulk of the coarse dust and the second pipe handles the finer dust which follows the blade.

An inexpensive hood for small circular saws is the doorless hopper in Fig. 19. Circular resaws and other high production saws are provided with hoods equipped with side doors for easy removal of heavy saws as well as to provide access to the pipe mouth for removing

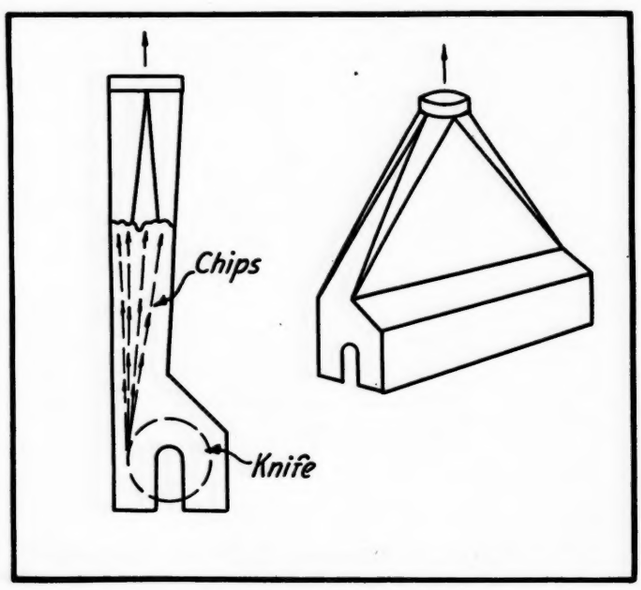


Fig. 22. Planer hood.

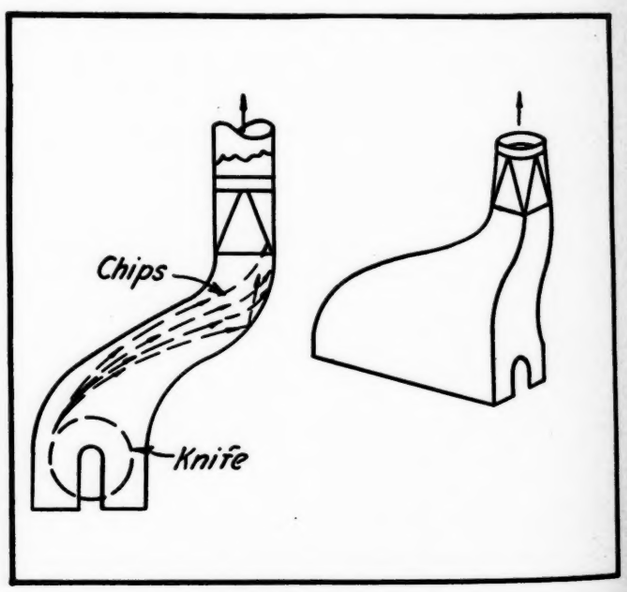


Fig. 23. Planer hood.

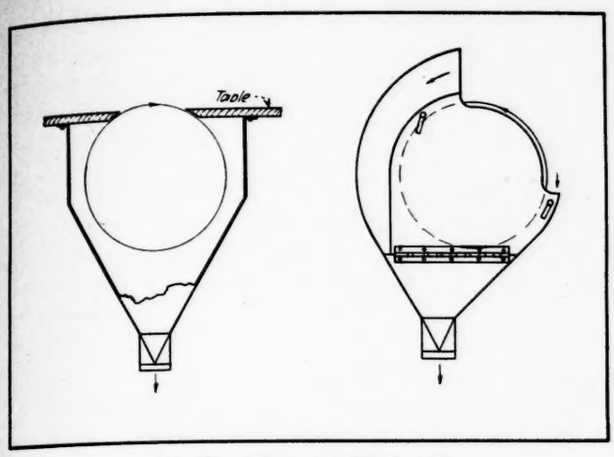


Fig. 24. Drum sander hoods.

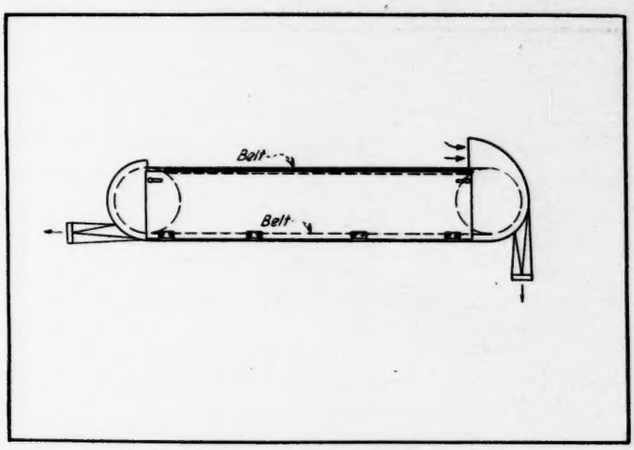


Fig. 25. Belt sander hood.

blocks and edgings.

The bottom of the swing saw hood, Fig. 20, slopes to the rear at an angle from the horizontal which is preferably 45° or more. When the angle is less than 45° or when the area of the saw slot in the table is too small to supply the necessary flow rate to keep the hood and branch pipe clean, a secondary air inlet may be cut in the end of the hood opposite to the branch pipe.

Shaper Hoods

There is no more difficult machine to hood than the vertical spindle shaper used for jobbing work. Because of its adaptability to both inside and outside cuts on pieces of almost any shape, the variety of work that comes to the shaper requires that the hood be fully adjustable and that it impose no restriction on the flexibility of the machine. Enclosing hoods can be applied only to single purpose machines. On all others an open hood is clamped to the table as close to the knife as the work will permit and in line with the chip trajectory. Ball and telescoping pipe joints are required in the connection to the main.

The effectiveness of a shaper hood depends upon the care with which it is adjusted for each job. A hood pushed back out of the way cannot collect chips. Because of the likelihood of improper adjustment as well as the essential difficulty of satisfactory all-purpose design, a high static suction is necessary to compensate for unfavorable conditions.

A typical shaper hood is shown in Fig. 21. The velocity contour characteristics of open hoods indicate improved performance when the hood mouth is flanged as shown in the alternative design.

Planer Hoods

The planer is representative of a large class of machinery whose operating principle depends upon high speed rotating knives. Molders, stickers, tenoners, jointers, and others are identical with planers so far as hood problems are concerned.

When the chip breaker of a planer is so constructed that the chips are thrown vertically from the knife as in Fig. 22, the hood is shaped like an inverted hopper. A chip breaker which causes a curved trajectory across the top of the cutter requires a hood shaped like Fig. 23. The hood walls conform closely to the sheaf of chip trajectories so that the chips are thrown into the pipe mouth. Those which strike the hood do so at an acute angle, never more than 60°, so as to cause ricochet into the pipe.

Planer hood contours must be developed from actual chip trajectories. The existing hood, if any, should be removed and a few boards run through the machine. Coordinates of points on the trajectory can be obtained by simple measurements while the chips are flying. The enveloping outlines of the hood can then be established so that most of the chips are thrown into the narrow, high velocity section and the remainder strike the hood walls at acute angles of incidence.

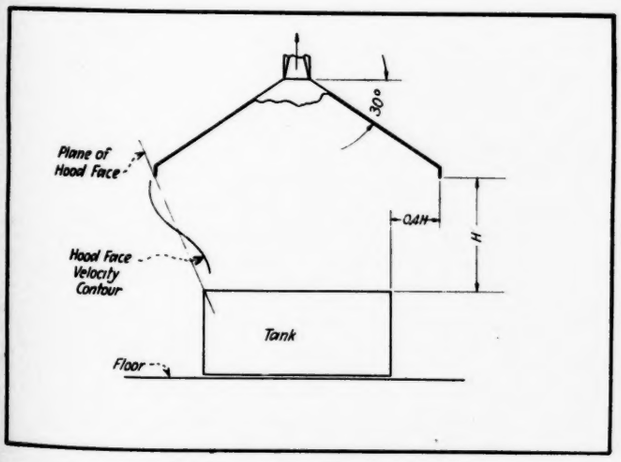


Fig. 26. Plain canopy hood.

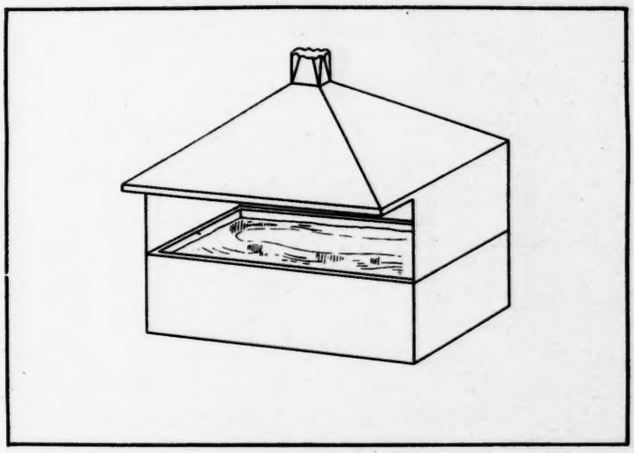


Fig. 27. Canopy hood with side enclosures.

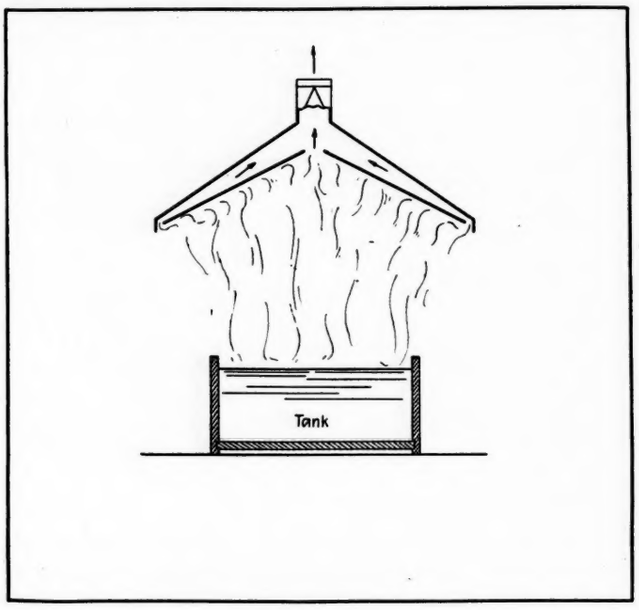


Fig. 28. Double hood.

While many machines are now received with factory-made hoods, their adequacy cannot be assumed with safety. The design should be checked by observing the actual chip paths. New hoods are cheaper than continued operation at excessive suction levels.

Sander Hoods

Wood sanding operations often produce greater volumes of dust than do metal grinding processes. Moreover, the natural abrasives often employed create greater hazard than do the artificial abrasives in general use in the metal trades.

Common sand drums projecting through tables are hooded from below with simple hoppers as in Fig. 24. The spindle sander hood resembles that for the variety shaper. Its face area may be made greater, however, and the face velocity lower. Large air volumes at low velocities are superior to low volumes at high velocities.

The horizontal belt sander, Fig. 25, is typical of all belt sanders. An outlet at each pulley to catch dust thrown from the belt by centrifugal force is almost essential for production belt sanders. Patternmaker's sanders used intermittently require less effective hooding.

Hoppers

Hoppers for bulk feeding of cotton, grain, etc., are best connected to open ended suction pipes as in Fig. 18. This arrangement always insures a high pipe velocity regardless of how choked the hopper may be. The conventional connection to a closed ended pipe will always clog more readily than the open pipe. The velocity in the horizontal pipe should be higher than the prevailing velocity in the rest of the system. Increased velocity without increased suction may be obtained by the use of favorable inlet shapes such as the flanged or unflanged cones.

Miscellaneous Machine Hoods

Hoods for shoe machinery, automatic lathes, drills, milling machines, and similar machinery, follow the principles already outlined. Always fit the hood to the dust trajectory. Provide no adjustments unless absolutely necessary. Operators seldom adjust hoods carefully even if health and safety depend upon good adjustment. Hoods must be rugged and must be attached solidly to the machine.

Top Hoods

Canopies are installed over tanks, forges, furnaces, and similar equipment from which rise smokes, fumes, and vapors lighter than air. The lower the canopy and the more completely the equipment is enclosed, the better is the control of fumes. The practical lower limit of height for hoods under which men work is about 80 in. from the floor. A typical open canopy hood with its approximate velocity contour in the plane of the face is shown in Fig. 26. Open hoods are particularly susceptible to the effects of cross drafts. Consequently, a partial enclosure, such as Fig. 27, is preferable. Side

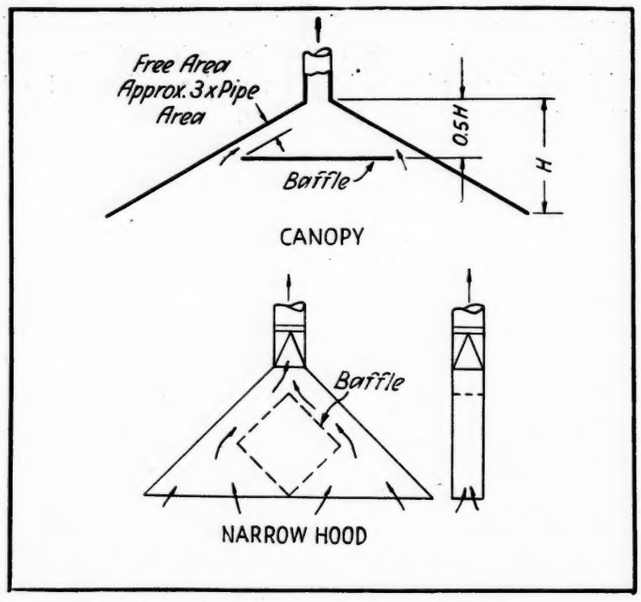


Fig. 29. Large hoods with distributing baffles.

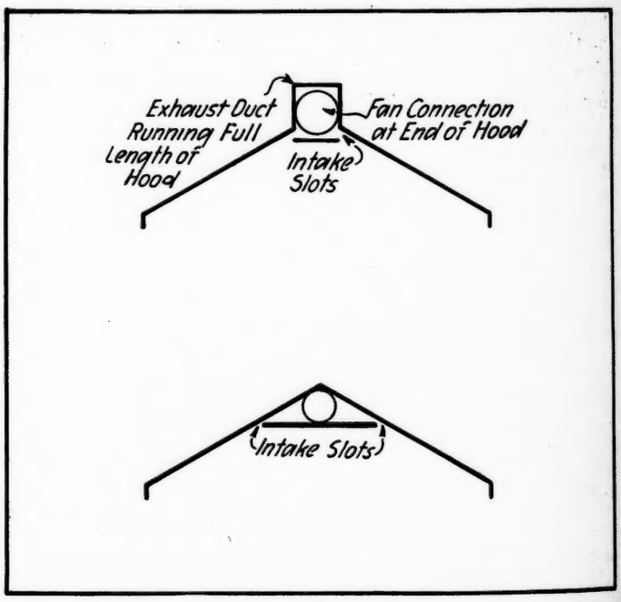


Fig. 30. Exhaust ducts built into long hoods.

curtains limit the area through which the fan must draw air, thereby reducing the size and cost of the entire system.

Double Hoods

The double hood, Fig. 28, consists of a canopy and liner so arranged as to form a narrow slot around the rim and a central opening under the suction pipe. The high velocity through the slot forms a shallow air curtain at the rim which prevents vapors from curling outward around the hood skirt.

Double hoods permit the use of lower face velocities for the same degree of effectiveness. When controlling poisonous fumes the face velocity should be the same as that commonly used for plain canopies. The increased efficiency of the hood will compensate for the greater hazard.

The chief objections to double hoods are the increased cost and the tendency for the inner chamber to act as a trap for condensible vapors. A gutter around the hood liner, draining back to the tank often surmounts the latter objection. Provision for cleaning should be made so as to reduce fire hazard from oily or resinous combustible condensate.

Face Velocities for Top Hoods

Top hoods require large volume rates of flow and are expensive to operate unless the vapor source is enclosed to the utmost. Hinged doors, weighted canvas curtains and sliding panels are devices which permit access to the equipment yet shut out unnecessary flow at other times. Table 2 illustrates the effect of partial side enclosures on the face velocity.

Supplementary estimates of vapor volumes to be handled may be made by estimating the upward velocity of the vapor in feet per minute and multiplying by the area of the generating surface in square feet. Stop-watch timing of upward movement of visible vapors is a simple way of estimating upward velocities. Smoke candles or "mechanical" smokes such as titanium tetrachloride or sulphur trioxide are sometimes useful in this connection.

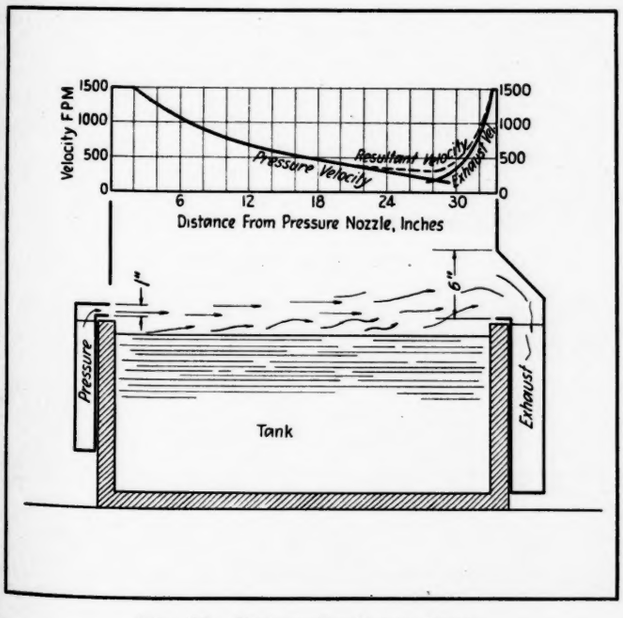


Fig. 31. Blow-and-exhaust hood.

TABLE 2—RECOMMENDED FACE VELOCITIES THROUGH TOP HOODS AND BOOTHS SUBJECT TO CROSS DRAFTS

Description	Velocity, f.p.m.
Canopy Hood, Plain	
Open, flow through 4 sides	200 - 250
Closed on one side, flow through 3 sides	175 - 200
Closed on two sides, flow through 2 sides	150 - 175
Closed on three sides, flow through 1 side	100 - 150
Canopy Hood, Double	
Velocity through sides same as above	
Through slot	1000
Through central opening. Adjust opening to produce required face, and slot velocities and total volume	
Booths	
Through one side	100 - 150
Laboratory Hoods (Door open)	
Through door	50 - 75

Multiple Suction Connections

Very large top hoods or long hoods of the planer type cannot be served effectively by a single suction pipe. There is a strong tendency for the flow to concentrate over the area nearest the pipe mouth to the detriment of more distant areas. Moderately large hoods may be baffled as in Fig. 29 in order to force flow from the ineffective areas. Very large hoods may be broken into a plurality of smaller hoods, each with its own suction pipe. If sufficient headroom is available, a still better air distribution may be obtained by incorporating a slotted suction pipe in the peak of the hood as in Fig. 30.

Blow-and-Exhaust Hoods

When the space over a tank is obstructed by monorails, trolleys and hoists, the blow-and-exhaust or "push-pull" system is an effective substitute for an exhausted top hood. In Fig. 31 clean air blows from the pressure hood across the liquid surface to the exhaust hood. Both hoods extend the full length of the tank. Additional exhaust openings at the end of the tank may aid in preventing escape of vapors.

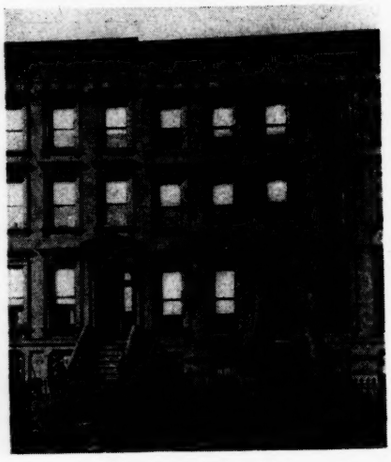
The velocity through the narrow slot of the distributing hood is usually from 1000 to 2000 f.p.m. The slot width will vary from ½ in. to 2 in. The range of air volume blown per square foot of tank surface is from 25 to 100 c.f.m.

The exhaust hood has a much larger opening than the pressure hood. Its upper edge should be as high above the tank rim as operating conditions will permit. The exhaust system should be designed to handle from three to six times the air volume delivered by the blowing unit in order to accommodate the inspirated air entrained by the pressure jet.

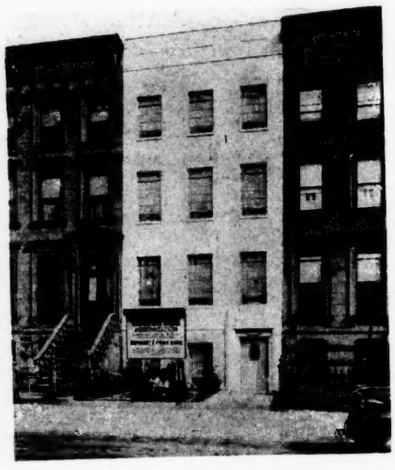
Booths

Booths for grinding or spray painting operations should be treated as canopy hoods with enclosure on three sides. The same face velocities apply. When the contaminating vapors or dust are heavier than air, it is often advantageous to handle work pieces over an exhausted grating at bench height. On larger work, a curtain of clean air blown downward between the operator and the work may be beneficial.

BEFORE—AND AFTER!



Before—27 Halsey St., February, 1937

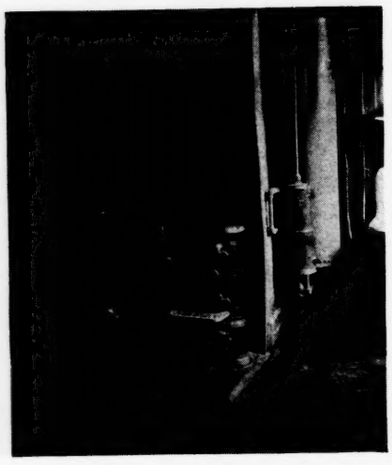


After—27 Halsey St., August, 1937

This house at 27 Halsey Street, typical of the large majority of old dwellings in many sections of Brooklyn, has recently been modernized and opened to the public as a Demonstration Model House. The owner, the Brevoort Savings Bank of Brooklyn, hopes that this attractive and profitable example of modernizing will help in the solution of an important civic problem now facing this community—the continuing migration of many of its old-time residents to the suburbs, and the consequent decline of old established neighborhoods.

Converted from a three-story and basement single family dwelling renting for a total of $25 monthly, into a six-family multiple dwelling renting for almost fifteen times as much, this house was formerly heated by a hand-fired warm-air furnace. An oil burner has now been installed with the storage tank buried in the front yard.

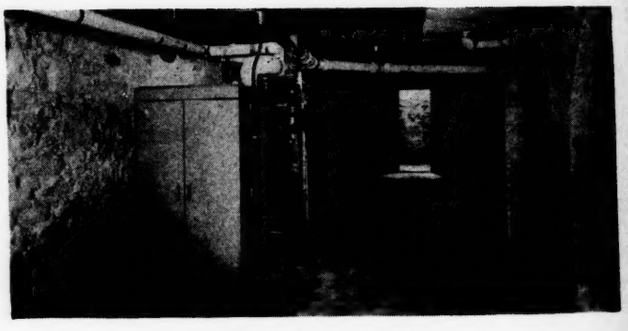
Robert Helmer and B. J. Smaller were the architects. The Modernization Bureau of Brooklyn Edison Co., Inc., cooperated in the remodeling.



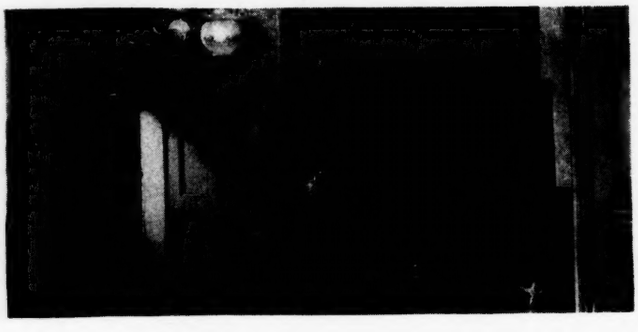
Before—Basement kitchen

After—Electric kitchenette

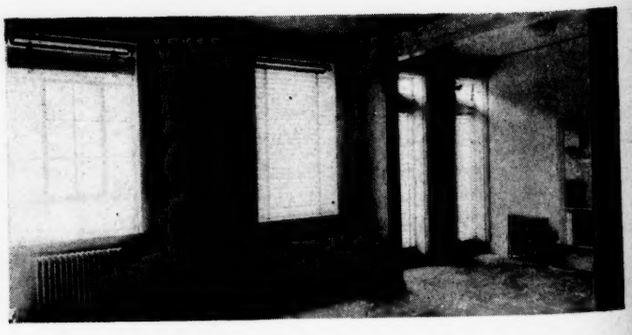
Before—Rear of cellar



After—Rear of cellar



Before—Corner of basement kitchen



After—Basement kitchen converted into living room

WHAT READERS SAY• • •

Traps

Your series of articles on traps by T. N. Adlam now appearing in HEATING & VENTILATING is very interesting. It brings to my mind a few questions that I wish straightened out.

It has been my practice to omit traps on equipment where the condensate is returned direct to the boiler; i.e., not through a direct return trap or pump, except where the height of the equipment above the water line of the boiler is sufficient to establish a static head in the vertical return pipe equal to or greater than the boiler pressure plus pressure necessary to overcome friction loss in piping.

If a trap is installed as shown in the accompanying sketch (Fig. 1) as is often done, will it not be a detriment rather than a help? When there is 1-lb. steam pressure on the boiler will not the condensate in the return pipe stand at A (pressure loss due to friction being disregarded)? When there is 2-lb. steam pressure or more on the boiler will not the condensate stand at B or the outlet of the trap? Whereas, if the trap is omitted, will not the condensate stand at a static height equal to the difference between the pressure in the boiler and the pressure at the inlet of the trap?

Are thermostatic traps and float-thermostatic traps applicable to installations where the condensate is elevated to a height above the equipment, steam pressure at trap inlet being sufficient? A laundry here uses thermostatic traps in such a manner with seeming success. It has been my practice to use an inverted bucket or open bucket type trap for such an installation. Fig. 2 illustrates my point.—*M. J. B., Memphis, Tenn.*

When a unit heater is connected direct to the steam boiler without any pump or return trap then it is advisable to eliminate the steam trap and to use an air vent only, or in other words the arrangement should be as shown in solid lines in Fig. 3. The air vent in this case should be a combined float and thermostat

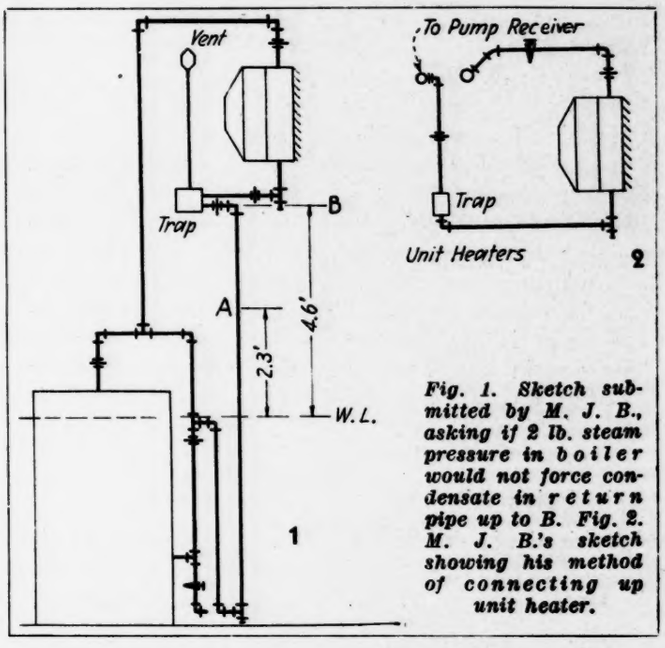


Fig. 1. Sketch submitted by M. J. B., asking if 2 lb. steam pressure in boiler would not force condensate in return pipe up to B. Fig. 2. M. J. B.'s sketch showing his method of connecting up unit heater.

so that water cannot escape should the water in the boiler back up the return pipe and steam cannot escape when steam fills the heater and part of the return pipe.

This arrangement of returning water direct into the boiler can be made quite satisfactory for low pressure jobs, but any unit heater or other piece of equipment will be more efficient and give off a greater number of heat units if the condensate and air can be discharged freely through a trap into an open pipe. This, of course, necessitates a pump for a large job or a boiler return trap for small jobs. The latter is illustrated in Fig. 4.

As regards M. J. B.'s Fig. 2 where the condensate is discharged up through a bucket trap to an overhead main, this arrangement would only be possible where medium or high pressure steam is employed. With low pressure steam the water would accumulate in the heat-

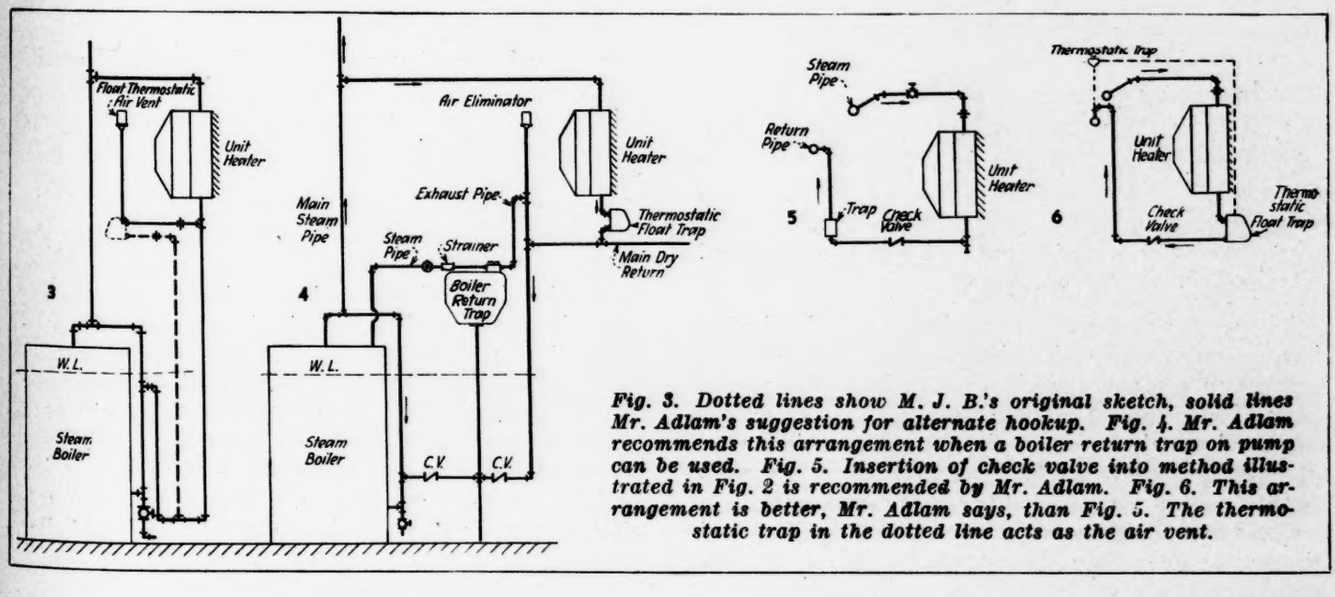


Fig. 3. Dotted lines show M. J. B.'s original sketch, solid lines Mr. Adlam's suggestion for alternate hookup. Fig. 4. Mr. Adlam recommends this arrangement when a boiler return trap on pump can be used. Fig. 5. Insertion of check valve into method illustrated in Fig. 2 is recommended by Mr. Adlam. Fig. 6. This arrangement is better, Mr. Adlam says, than Fig. 5. The thermostatic trap in the dotted line acts as the air vent.

er until sufficient pressure had accumulated to drive the water through the trap and into the return pipe overhead. This would create noise and produce cold drafts from the heater. Even so it would be necessary to have a check valve on the horizontal pipe between the heater and the inverted bucket trap, to prevent water backing from the trap should the steam pressure drop (see Fig. 5).

A float and thermostatic trap would be a better arrangement for such conditions whereby the condensate can gravitate from the heater into the trap and then discharge overhead into the return pipe as shown in Fig. 6, the check valve being placed beyond the trap and the discharge pipe being carried above the main return so that condensate from other sources does not back into the steam traps. Sometimes an improved arrangement is made by using a float trap below the heater as in Fig. 6, but with a separate thermostatic air vent discharging into the return main. This is shown in dotted lines on Fig. 6.—*T. Napier Adlam*

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Rain Dries Air

A friend of mine and I had an argument. . . . He claims that rain dries the air; I claim that rain saturates the air. . . . Who wins?—*C. T. K., Jr., New York.*

Your friend. There is continuous and often rapid evaporation from practically all parts of the earth's surface. Nevertheless the atmosphere as a whole never becomes even approximately saturated. Water is always evaporating into the air and thus tending to saturate it; but, on the other hand, the air is always being dried by the precipitation out of it of rain, snow, and other forms of condensation. Whatever the temperature and relative humidity of a given mass of air at any place along its convectional route, the total of water vapor it then contains is less, in general, than when it left the surface of the earth by the amount of precipitation in the meantime abandoned by it. That is, on the average, air descends to the earth drier than it was when it ascended, and drier solely because of, and in proportion to, the amount of precipitation that fell out of it during its convectional journey. In short, rain does dry the air—does prevent it from becoming and remaining everywhere intolerably humid, as it otherwise would be.

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Psychrometry

I would like to know just what would be the effect of saturating the air in the bonnet of a warm air furnace when the bonnet temperature is about 300F. When this saturated air is discharged into the room will some of the moisture condense out and wet the walls and glass?—*J. P. W., Detroit, Mich.*

The answer to the first part of your question is that in a warm air furnace it is impossible for a number of reasons to saturate the air when it is 212F or over. First of all, space at a temperature of 212F or over if saturated would contain no air—only steam. The total pressure of saturated air is made up of the partial pressure of the water vapor and the partial pressure of the air. As the temperature of saturated space is increased the pressure of the water vapor is increased and since the total pressure remains the same the pressure of the air decreases. When the temperature of the space reaches 212F the water vapor pressure is just equal to the atmospheric pressure so that only water vapor occupies the space. When the temperature of the space is increased over 212F the steam continues to occupy the entire space and becomes superheated. Under these conditions the space is saturated with superheated water vapor.

Thus it is impossible to have saturated air when the temperature is 212F or above.

From the practical standpoint it is impossible to have saturated air when the bonnet temperature is close to 212F because the furnace could not develop enough heat to evaporate the water necessary to saturate the air.

Suppose a warm air furnace with an output of 100,000 B.t.u. per hr. was delivering 500 c.f.m. at about 200F. If the air was being delivered to the furnace at 70F and 50% R.H. and left at 200F and 100% R.H. approximately 0.02913 lb. of water would have to be added to each cubic foot. To saturate 500 cu. ft. about 14.56 lb. of water would have to be added each minute. This would require roughly about 14,560 B.t.u. per min. or 673,600 B.t.u. per hr.—just to saturate the air. This is nearly 600% over the total capacity of the furnace.

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Stack Losses

Considerable study has been given to the proposition of salvaging all of the heat possible, which ordinarily goes up the stack. While the use of economizers designed for this purpose will undoubtedly go a long way in many cases in reclaiming much of this heat, we should not lose sight of the fact that the relative cleanness of the boiler tubes has a great deal to do with the matter as well. Tubes loaded up with scale and thereby insulated, instead of transmitting the heat to the water, allow it to pass on unabsorbed and toward the stack. If there is grease in the feedwater, the tubes will soon accumulate a coating of grease, which has high insulating properties, and which therefore tends to increase the heat loss up the stack.

Seeing that these things are so, many plants would profit by making a periodical study to determine whether everything that can consistently be done to keep their tubes in the best of condition is being done. There are many factors that can be examined. Boiler specialists can advise as to the best method of keeping as free of scale or of grease as possible. In some cases, where it is especially hard to separate grease from condensate returning from steam engines, etc., it may pay to sacrifice the heat units in such water, and the water itself, rather than to allow a coating of grease to form on the tubes.

Another factor that may be worth checking in some cases is the type of fuel used. There are those who contend that a cleaner condition of the tubes usually occurs if and when fuel oil is being used. That may be true in some cases, though we are not prepared to say that it is true in general. It will pay, however, in most all cases, to have a thorough checkup on tube condition and improvement possibilities. There can be no question that clean tubes constitute the very heart of boiler efficiency.—*John E. Hyler, Peoria, Ill.*

EDITORIALS

Heating in the PWA Apartments

Appointment of the new administrator to head the latest government venture into low cost housing and slum clearance under the Wagner Housing Act marks the first step in getting the plan moving. The appointment goes to Nathan Straus of a well-known New York family and a man having a background of editorial, business, and housing experience. To what extent his appointment means the dissolution of the engineering organization which has so capably handled the PWA housing projects is not known. It is to be hoped that at least some of the ideas and methods found useful in heating these earlier multiple housing projects will be retained under the new plan. We continue to believe that the heating methods used in the PWA projects make up a distinct contribution to heating practice, and that they are immensely, if immeasurably, better than the practices which were all too common in apartment house work before the PWA projects opened up the field. Before that occurred apartment house practice was stagnant, notorious for skimping and slipshod installations. The PWA projects definitely demonstrated that good practice in such installations need not be unduly expensive or unduly complicated. The new housing plan has a chance to salvage much of this experience.

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Stoker Fuels

Ever since coal has been fed by stokers the problem of suitably coordinating the coal with the stoker has been present. With large industrial stokers it was frequently solved by trial and error in each installation. Skilled superintendence was usually available for this purpose and such a procedure was a practical one.

In early attempts to produce small unit stokers on a quantity basis with national marketing of a single product it was soon observed that stokers which were wholly successful in certain localities were virtually inoperable in other localities where the local coals differed sharply from those for which the stoker was designed. Since local coal supplies usually must be used to meet competition with other fuels, one of the pressing problems in connection with small underfeed stokers has been that of fitting the stoker to the fuel, the fuel to the stoker, or else adjusting both stoker and fuel until they would work suitably together.

It cannot be said now that the problem is solved but some light is being thrown on it and it continues to receive careful study. Recently, Bituminous Coal Research reported that its burning tests using representative bituminous coals in underfeed stokers show that the size of the coal used is an important factor in the uniformity and dependability of operation of stokers only with strongly caking coals. The report noted that the rate of air supply must be changed as the rate of coal feed is changed if uniform combustion efficiency is to be maintained. In other words a stoker can not be expected to handle various sizes of coal without making suitable adjustments, and it follows that if a stoker can not be adjusted then probably the only way to find a suitable coal is by trial. But if a stoker is provided with flexible adjustments it should be possible to use it with a number of different coal sizes. It is possible that if enough flexibility can be provided at the stoker then any reasonable range of sized and prepared coals can be expected to produce performance in any given stoker. The problem is essentially the same as that faced by oil burner designers before oil fuels were standardized commercially and generally available in uniform grades.

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Moisture in Insulating Materials

Most of the heat insulating materials used in building construction depend for their effectiveness on air spaces within their form and structure. If moisture gathers in these spaces or if moisture flows through them or if moisture freezes in these spaces much of the heat insulation effectiveness is thought to be lost. Engineers in making calculations for sizing heating plants use calculating constants which assume that these insulators are dry. Not only are the plants sized on this assumption but estimates of anticipated fuel consumption and economy in fuel use are also made on a similar basis.

Many of these insulating materials have been in use in all parts of the country for a considerable period. There is much printed evidence based on field studies which indicates that the anticipated fuel consumptions have been realized and that plants whose capacities have been fixed by assumption of dry insulation have been adequate to meet peaks. Of late years, however, disquieting rumors have been circulating through the industry to the effect that some insulations lose their effectiveness in time, due principally to moisture finding its way into the materials. If these things are happening the engineer who designs plants wants to know of them and has a right to know for he assumes a considerable degree of responsibility. So far little or nothing has found its way into print which would tend to confirm these rumors but as long as they persist we are confronted with a bad situation. What is needed is a straightforward statement of the facts to date together with information showing what should be done to assure the maintenance of heat insulating properties under the moisture conditions encountered in practice.

ABSTRACTS of Current Papers, Books and Pamphlets

Heating and Air Conditioning Fundamentals

Here is a book which is written primarily for undergraduate students of heating and air conditioning. Because it has been written with this purpose in mind, it deals principally with the essential fundamentals of the subject. It should, therefore, serve as a valuable textbook for mechanical engineering, architectural engineering, and architectural students.

While this book does not present any new information, it is a good compilation of existing material, particularly in regard to heating. Typical examples of calculation are included whenever they seem necessary for clarity.

The book is particularly noteworthy because of the large number of sketches of commercial equipment. An attempt has been made to supply sufficient catalog data for commercial equipment so that the student may do some design work as a part of his training. A list of the chapter headings includes the following: Essential Definitions; Factors Affecting Human Comfort; Heat Transmission; The Calculation and Estimation of Heat Losses and Heat Gains; Radiators and Convectors; Fuels and Combustion; Heating Boilers; Flow of Steam in Pipes and Piping Details; Heating with Steam; Heating with Hot Water; Air Conveying and Cleaning; Ventilation; Heating with Warm Air; Air Humidification and Dehumidification; Control of Air Temperature and Humidity; and Summer Cooling.

[*"Heating, Ventilating, and Air Conditioning Fundamentals," by William H. Severns. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York. Cloth bound; 6 x 9 in.; 467 pages; price, $4.*]

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Introduction to Climate

For engineers who are interested in the borderline subjects related to the art of heating and air conditioning, a recent publication on weather and climate may be of considerable value. This book "Introduction to Weather and Climate," is in the nature of a handbook designed to provide a study of the atmosphere. The book is avowedly introductory in character and is climatic rather than meteorological in its point of view. It is composed of two relatively distinct parts, the first of which covers the field of weather and climatic elements. This part is analytical in character and treats the several climatic elements, such as temperature, precipitation, and storms. While causes and origins are not omitted, that phase of the subject receives less emphasis than does description. Part 2 discusses regional climates and gives a rather detailed explanatory description of the various types of climate and their world distribution. Of particular interest to engineers in this country is the material relating to the different climates in the United States.

Part 1 is divided into four chapters, covering air temperature and insolation, atmospheric pressure and winds, atmospheric moisture and precipitation, and storms, while Part 2 consists of five parts, devoted to the tropical rainy climates, dry climates, humid mesothermal climates, humid microthermal climates, and highland climates. All of these are exemplified in the United States with the exception of the tropical rainy climates.

[*An Introduction to Weather and Climate," by Glenn T. Trewartha, associate professor of geography, University of Wisconsin. 6¼ x 9¼ in.; 373 pages, with three large fold-in maps (one in color) and four separate charts in a pocket in the back. Published by McGraw-Hill Book Co.; price, $3.*]

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Oil Burning

It is seldom that an author of a technical book does such an excellent job in covering a subject as H. A. Romp has done in this book on oil burning. It is reasonable to expect that this book will take its place as one of the outstanding reference books on oil burning.

Although the author of this book is a Dutch engineer, he shows an extremely wide knowledge of oil burning as it is practiced in the various parts of the world.

The opening section of the book traces the historical development of oil burning as it progressed in Russia, America, and western Europe. This part is particularly interesting as it shows the numerous mistakes made by early inventors and also how these mistakes were rectified and modern oil burners were developed. Also discussed in this section are more recent developments and the differences between American and European burners.

The basic principles of oil burning are clearly presented in the second section. This discussion is probably more complete than any appearing in a book on oil burners and should prove extremely instructive to all engineers interested in the combustion of oils. It takes up such subjects as the physical and chemical properties of fuel oil; theory of combustion; combustion of hydrocarbons; discussion of various types of oil burning; discontinuous oil flames in engines; seven stages of the oil burning process; quantitative and qualitative combustion process; and surface combustion.

The third section deals with the modern forms of oil burners and oil devices. It opens with a discussion of systems of classifying oil burners, including such systems as the decimal, mechanical analysis, British Patent Office, and by the method of preparing the oil for combustion. It then discusses the various types of burners which are classified according to the method of preparing the oil. Some of these classifications are vaporizing; mechanical pulverization; steam atomization; high pressure air; low pressure air; and flue gases.

The fourth section is entitled Future Development of Oil Burning, and includes a forecast of what developments can be expected. This section includes domestic oil burning and domestic oil burners; the development

of automatic domestic oil burners for heavy oil; future development of the fire pot type; influence of water vapor on carbon troubles; natural draft burners; range burners; and the cost of oil burning. A list of books and magazines dealing with oil burners is included.

[*"Oil Burning," by H. A. Romp. Published by Martinus Nijhoff, the Hague, The Netherlands. Cloth bound; 7 x 10 in.; 336 pages; price, 12 guilders, or approximately $6.70.*]

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Water Requirements of Air Conditioning Machinery

For air conditioning, the chief water-using device is the condensing unit—the purpose of which is to condense a gas or vapor so as to remove its latent heat of vaporization. Most condensing units include a centrifugal or reciprocating compressor, with Freon the most commonly used refrigerant.

Take, for example, a 15-hp. machine, with Freon condensing unit. A brief study of its water requirements will indicate the characteristics of such machines in general. It must operate at a given suction gas temperature to furnish desired air conditions. With a discharge pressure of 130 lb. per sq. in. it will supply 15 tons of refrigeration and require 770 gal. of water per hour, if the water enters the condenser at 60F. This amount increases to 1060 g.p.h. at 70F, 1640 at 80F, and 3820 at 90F. Altering the amount of water used changes the discharge pressure of the hot gas, and this affects the refrigeration capacity and the electrical input of the compressor motor. The water flow is, therefore, usually adjusted to arrive at the most economical balance of water and power costs, with the refrigeration load as a limiting factor.

Returning to the figure of 1060 g.p.h. with 70F water, this might be increased to 2800 g.p.h. at 110 lb. discharge and there would then be a 10% increase in refrigerating capacity and a 6% decrease in power input. However, if the cost of water in the community happened to be high, the consumption of 70F water could be cut down as low as 600 g.p.h. with a 5% increase in electric cost and a 10% drop in refrigerating capacity. With this condition, the water would be discharged to the sewer at about 110F, which might in some cases violate municipal regulations. In the case of the large consumption of 2800 g.p.h. the condenser friction would be 36 lb. per sq. in. pressure drop. This can be overcome by making a simple change in the condenser water header connections, giving more parallel tube flow, but this increases the water used about 25%. The pressure drop then becomes less than 9 lb. in this case.

Where water is scarce or very expensive, condensing is sometimes done by forced air blown through large Freon condensing coils, but this means high condensing pressures with resulting high power input and reduced refrigerating capacity. A much more common way of avoiding high water bills is by the use of atmospheric cooling of the water in spray ponds, or towers, or in forced draft towers. The condenser heat is then taken up by evaporating water, and the water is continually recirculated, only makeup water being required. A refinement of this is the evaporative condenser, in which the condenser is in effect built right under the spray heads of a forced draft cooling tower.

Water vapor refrigerating machines are sometimes used for larger sized air conditioning installations. When water is cheap and steam available at low cost, the steam jet vacuum plant is often very attractive. Since the motive steam must be condensed, as well as the water vapor which serves as a refrigerant, the water used will be in the range of from 120 to 360 g.p.h. per ton of refrigeration.

Self-contained room coolers are not yet an important factor in water use, but may rapidly become so. They have the refrigerating unit built right in the air cooling cabinet. Like the larger Freon units, they may be air or water cooled, but for room coolers water piping is sometimes undesirable. Water cooled room coolers average about 30 g.p.h. of 70F water.

[*"Water Requirements of Air Conditioning Machinery," by E. N. Bowles; Journal of the American Water Works Association, 29 W. 39th St., New York; June, 1937; pages 822 to 825.*]

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Heating Equipment Use by Various Income Classes

With the issuance of two new volumes, the Department of Commerce has completed its study of consumer use of selected goods and services by income classes. This study, which covered all of the cities surveyed in the Real Property Inventory and is based on the information collected in the Real Property Inventory, reveals characteristic differences in living standards among various income classes and bears on ownership of some of the principal durable goods commodities, including heating apparatus as well as fuels for heating.

One of the newly-issued volumes (Market Research Series No. 5.11) of this study covers the following cities: Providence, R. I., Williamsport, Pa., Peoria, Ill., Kenosha, Wis., Minneapolis, Minn., St. Joseph, Mo., Springfield, Mo., Jacksonville, Fla., Atlanta, Ga., Charleston, S. C., Richmond, Va., Jackson, Miss., Little Rock, Ark., Dallas, Tex., Pueblo, Colo., Seattle, Wash.

The other (Market Research Series No. 5.12) includes data on Cleveland, Ohio, Decatur, Ill., Lincoln, Nebr., Sioux Falls, S. Dak., Topeka, Kans., Wichita, Kans., Ashville, N. C., Greensboro, N. C., Hagerstown, Md., Wheeling, W. Va., Baton Rouge, La., Wichita Falls, Tex., Boise, Idaho, Butte, Mont., Phoenix, Ariz., Sacramento, Calif.

Cities covered in previous reports were: Austin, Tex., Birmingham, Ala., Burlington, Vt., Casper, Wyo., Columbia, S. C., Des Moines, Iowa, Erie, Pa., Fargo. N. Dak., Frederick, Md., Lansing, Mich., Oklahoma City, Okla., Paducah, Ky., Portland, Maine, Portland, Oreg., Racine, Wis., Salt Lake City, Utah, San Diego, Calif., and Trenton, N. J.

[*Consumer Use of Selected Goods and Services, by Income Classes, Market Research Series Nos. 5.11 and 5.12. Size 8 x 10½, bound in heavy paper, approximately 125 pages each. Available from the Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C. Price, each volume, 25c.*]

Detection of Toxic Gases

There is a law in effect in England which states that before a person is allowed to enter a place or vessel which is thought to contain a dangerous gas the atmosphere has to be tested by a responsible person. The Chemical Defence Research Department of the Department of Scientific and Industrial Research was selected to develop a series of simple and rapid chemical tests for determining low concentrations of dangerous gases. Among the gases and vapors for which tests will be developed are aniline, arsine, benzene, carbon bisulphide, carbon monoxide, chlorine, hydrogen cyanide, hydrogen sulphide, nitrous fumes, organic halogen compounds, phosgene and sulphur dioxide. This is the first of the series of tests and gives the tests for hydrogen sulphide. Lead acetate paper is placed in a special holder and a sample of air is drawn through the paper. The stain obtained is then compared with a sheet of standard stains which is included with this report. Hydrogen sulphide concentrations as low as one part in 150,000 parts of air can be measured.

[*"Methods for the Detection of Toxic Gases in Industry, Leaflet No. 1, Hydrogen Sulphide." Published by the Department of Scientific and Industrial Research, available in this country from the British Library of Information, 270 Madison Ave., New York. Paper cover, 6 x 9 in., 10 pages, including a standard stain sheet. Price, 3s 6d., or $1.15.*]

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Liquid Fuels

During the last decade the field for the use of liquid fuels has widened so greatly that it is impossible to present an exhaustive survey of the entire field in one volume. There are, however, many engineers and technicians who do have a use for a book which deals with the main features of this wide and rapidly developing field. It is to meet the needs of such men that this book has been written. The book is intended solely as a concise manual for those interested in or engaged in the liquid fuel trade.

The subject is covered in a thorough manner, starting with the chemistry of liquid fuels and taking up the various methods of preparing liquid fuels, including petroleum refining, shale oil, coal tars, lignite tars, animal and vegetable oils, ethyl alcohol, and synthetic fuels.

The next two sections deal primarily with liquid fuels for internal combustion in engines and are, therefore, of only slight interest to heating engineers.

The following chapter gives a discussion of fuels for external combustion, the first part dealing with petroleum liquid fuels for external combustion, the second with the chemistry of combustion, and the third with the utilization of liquid fuels for external combustion.

The last chapter deals with the significance of tests and analytical methods. A number of tables and graphs on conversion factors, properties of liquid fuels, ignition temperatures, and heat values are included in the appendix.

[*"Liquid Fuels," by Harold Moore. Published by D. Van Nostrand Co., Inc., 250 Fourth Ave., New York. Cloth binding; 6 x 9¾ in.; 263 pages; price, $9.*]

Care of Films in Libraries

Progress made in the use of photographic film for copying, in miniature, important reference records, and the apparent certainty of widespread expansion in the use of films for many classes of library records, make the care and preservation of films a problem of immediate importance to librarians.

Two kinds of film are available for this purpose: first, cellulose nitrate, which is very inflammable and chemically unstable and, second, cellulose acetate ("safety film") which is slow-burning and chemically stable. Both kinds have been used for copying documents in miniature, but at present only safety film is in general use for this purpose. Acetate film presents no greater fire hazard than ordinary paper, and although the safety film now used is a comparatively new material, it has been found in tests at the National Bureau of Standards to be very stable, if properly made and processed. However, the preservation of acetate film requires control of moisture content.

The cellulose acetate film used for records is hygroscopic. It adjusts its moisture content to conform to the humidity of the surrounding air, and changes in moisture content affect its properties.

The film is brittle under the conditions often encountered in rooms without air conditioning, making control of the moisture content essential. The conditions suggested for storage and use of film are those recommended for the preservation of books in libraries; namely, 50% relative humidity and 70 to 80F.

Nitrate film is perishable and highly combustible. Storage of this type of film should be undertaken only in approved fireproof cabinets, and these should be within vaults of fireproof construction. Low temperature and low relative humidity are recommended to retard the deterioration of films in storage. Film containers for nitrate film should be vented to permit free escape of the products of decomposition (principally nitrous oxides) since their presence accelerates deterioration.

[*"Care of Filmslides and Motion-Picture Films in Libraries," by Charles G. Weber and John R. Hill; Research Paper RP942, National Bureau of Standards, U. S. Department of Commerce. 6 x 9 in., 10 pages; obtainable from the Superintendent of Documents, Washington, D. C.; price, 5c.*]

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Oil Heating Handbook

Only a few changes have been made in the second edition of this book. The greatest change is in the chapter on service, which now occupies 11 pages in place of the two pages in the former edition. This chapter now includes information on oil tanks, lines, valves and strainers, pumps, nozzles, electrical equipment, and vibration and noise.

The book is divided into five main sections entitled: Oil Burner Classification; Fuels and Combustion; Heat Systems and Controls; Survey and Installation; and Retail Selling.

[*"Oil Heating Handbook," by Han A. Kunitz, published by J. B. Lippincott Co., Philadelphia; flexible cover; 5 x 7½ in.; 464 pages; price, $3.*]

Air Conditioned Cabinet for Growing Plants

The demand for experimental evidence on problems requiring accurate control of temperature and humidity prompted the development of an apparatus in which growing plants could be placed under as nearly natural light as could be obtained. Such a cabinet was developed by C. O. Grandfield of the Bureau of Plant Industry of the Department of Agriculture, and F. J. Zink, professor of agricultural engineering of the Kansas Agricultural Experiment Station.

The design and construction of the cabinet together with drawings and photographs are described in a recent reprint from the Journal of Agricultural Research.

[*"A Humidity and Temperature Control Cabinet for Growing Plants," by C. O. Grandfield and Frank J. Zink. An 8-page reprint from the Journal of Agricultural Research. Size 5⅞ x 9⅛ in. Obtainable from the Superintendent of Documents, Washington, D. C.; price, 5c.*]

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BRIEF REVIEWS

REFRIGERATION. The second edition of this well-known book on refrigeration deals principally with large ammonia refrigerating systems. One small section deals with domestic refrigeration and another with air conditioning. The book is a practical treatise in question and answer form. [*"Audel's Answers on Refrigeration, Domestic Refrigeration and Air Conditioning," by G. Harris. Published by Theo. Audel & Co., 49 W. 23rd St., New York; leather cover; 512 pages; 5 x 7 in.; price, $2.*]

PREVENTING WELDING FIRES. Rules to follow for preventing the possibility of welding or cutting fires. [*"Preventing Welding and Cutting Fires," published by The Linde Air Products Co., 30 E. 42nd St., New York. Paper cover; 4½ x 6½ in.; 16 pages; free on request from any Linde office.*]

MODERNIZATION. Describes how gas heating and cooking can be effectively utilized for modernizing old dwellings and tenements. Gives details of a typical modernization job on a three-story tenement house and presents a blank form for making a real estate survey and analysis of such property. Also gives data on the final set-up showing annual income and expenses. [*"Profitable Modernization by the Use of Gas," published by the Brooklyn Union Gas Co., 176 Remsen St., Brooklyn, N. Y. Paper cover; 8½ x 11 in.; 28 pages; available on request.*]

STEEL PIPE THICKNESS. The purpose of this paper is to present engineering data for determining the wall thickness of steel pipe for underground service under various conditions of soil corrosion. It should be noted that the paper refers to outside corrosion of pipe lines in soil and not to internal corrosion due to water. [*"A Method of Determining Wall Thickness of Steel Pipe for Underground Service," by Russell E. Barnard; Journal of the American Water Works Association, 29 W. 39th St., New York; June, 1937; pages 791 to 807.*]

DUST COUNTING. A description of a new micrometer eyepiece which has only one ruled grid corresponding in size to one quadrant of the usual Whipple grid. This new eyepiece is used by the Division of Industrial Hygiene of the United States Public Health Service and it is said that the results obtained are identical with results obtained when counting one-fourth of the Whipple field. [*"Note on a New Ocular Micrometer for Use in Dust Counting," by Richard T. Page; pages 1315-16, Sept. 17, 1937 issue of Public Health Reports; published by United States Public Health Service; for sale by the Superintendent of Documents, Washington, D. C.; price, 5c.*]

WINDOW CONDENSATION. A study of the condensation of moisture on windows during the heating season. Presents a considerable amount of information as well as tables showing the relative humidity indoors above which moisture will deposit on the inner glass surface of windows. Includes a short bibliography. [*"Moisture on Windows," by R. Ruedy; Division of Research Information, National Research Council of Canada, Ottowa. Heavy paper cover; 8½ x 11 in.; 8 pages.*]

AIR CONDITIONING REGULATIONS. Regulations of the National Board of Fire Underwriters which apply to air duct systems employing mechanical means for the movement of air and used for heating and ventilating. Includes warm air heating systems, plain ventilating systems, combination heating and ventilating systems, air cooling systems, air conditioning systems, and exhaust systems. Regulations do not apply to systems for the removal of flammable vapors and residues nor to systems conveying dust, stock, or refuse by means of air currents. These regulations were published in full in the July, 1937 issue of HEATING & VENTILATING, page 52. [*"Regulations of the National Board of Fire Underwriters for the Installation of Air Conditioning, Warm Air Heating, Air Cooling and Ventilating Systems." NBFU Pamphlet No. 90, July 15, 1937. Published by the National Board of Fire Underwriters, 85 John St., New York. Paper cover; 19 pages; 6 x 4 in.; available on request.*]

SMOKE ABATEMENT MANUAL. The 1937 edition of the Manual of Smoke and Boiler Ordinances and Requirements in the Interest of Smoke and Air Pollution Regulation and Fuel Combustion. Among the data included in this manual are: description of methods of measuring air pollution; equipment and procedure of dust fall determination; thimble method for determining dust loading in flue gas; thimble method for atmospheric dust loading measurement; removal of solids from chimney gases by electrical precipitation; atmospheric pollution in Chicago; report on New York City Air Pollution Survey; smoke prevention and elimination of dust from stacks of generating stations; smoke and fly-ash prevention at the Central Heating Plant, Washington, D. C.; secrets of economical heat; and heating boiler maintenance and operation. [*"Manual of Smoke and Boiler Ordinances and Requirements," published by the Smoke Prevention Association, 139 N. Clark St., Chicago. Paper cover; 6 x 9 in.; 152 pages; price, 50c.*]

NEWS OF THE MONTH

Nathan Straus Appointed as Housing Act Administrator; $100 Million To Be Spent for Slum Clearance Next Year

WASHINGTON—Nathan Straus, former New York state senator and NRA administrator, was appointed by President Roosevelt on October 18 as administrator of the United States Housing Authority and as such to direct the government's long-range $526 million program for slum clearance and low-cost housing.

A son of one of New York's philanthropists, Mr. Straus has conducted studies of housing abroad for New York's Mayor La Guardia and is now a member of the New York City Housing Authority. He will direct, under Secretary Ickes, the administration of the Wagner Housing Act, one of the few major social plans approved in the last session of Congress.

The new Federal housing program is aimed at elimination of slums in large cities and construction of low-rent housing units for the lower income groups.

Mr. Straus, whose appointment is subject to Senate confirmation, was sworn in October 20 and stated that he would assume his duties November 1, and would take over the personnel of the PWA Housing Division to aid him in administering the $526 million slum clearance program.

He is "confident," Mr. Straus declares, that adequate housing projects can be constructed under the $1,250 a room limitation carried in the housing act. He points out that he constructed his own housing project, Hillside in the Bronx, which he said is much more elaborate, at a cost of $1,045 a room.

The 51 completed and uncompleted PWA housing projects will be soon transferred to the new Housing Authority, Mr. Straus said, along with the personnel of the PWA housing division. The resettlement projects, he went on, will not be transferred to his agency for the time being.

In a statement to the press, Mr. Straus said:

"I am happy to be enlisted for service under President Roosevelt and Senator Wagner, who are leading America to a better way of life.

"Long familiarity with injustice or human misery breeds callous indifference to it. We come to tolerate conditions that should arouse our indignation and shock us into action. That is the case with the slums.

"It is to the eternal credit of President Roosevelt and Senator Wagner that they have awakened the American people from complacent acceptance of the blight of the slums. We have no sufficient perspective today to evaluate that service, but there is no doubt of the verdict of posterity.

"My own job is to get the slums razed and get decent homes built. It's a job that calls for action and very little talk.

"The first task is to lay out the broad policies of the United States Housing Authority. For that I will consult with Senator Wagner, Secretary Ickes, Mr. Gray (Howard A. Gray, Director of the PWA Housing Division), and also I will be guided largely by the local Housing Authorities, charged under the law with the initiation, construction, and management of the housing projects.

"In justice to thousands of people seeking jobs and in justice also to the existing staff of the housing division of the PWA, which will be transferred to the new Housing Authority by executive order shortly, I would ask the press to be good enough to announce that I do not contemplate engaging any personnel at this time. I intend to work with the staff that Mr. Gray tells me has loyally served him and the cause of housing.

" 'Let not him that girdeth on his harness boast himself, but that he putteth it off.'—i Kings, 20:11."

The appointment of Mr. Straus was interpreted as a victory for the Mayors and housing officials who opposed placing control of the administration of the Wagner act under the Interior Department. They and Senator Wagner wanted the Housing Authority to be an independent organization reporting directly to the President. However, the bill was amended to vest the final control in the hands of Mr. Ickes.

Mr. Ickes and his PWA are said to have advocated the appointment as administrator of the new housing program of Howard R. Gray, head of the housing division of the PWA, the organization which has handled previous Federal attempts at slum clearance and low-cost housing. Mr. Straus was the candidate of those who have advocated greater decentralization of housing with more responsibility given directly to the cities.

The Housing Authority is authorized to issue a half-billion dollars worth of bonds in the next three years—$100 million at once and $200 million in each of the next two years.

The bonds are to be guaranteed by the Federal Government and the money raised from their issue is to be used for loans to local housing authorities or municipal bodies, to be repaid with interest by them over a period not to exceed 60 years.

In addition, the act authorizes an appropriation of $25 million at once for additional financial help to local housing projects. One method of financing contemplates annual subsidies from this and future authorizations or appropriations which would make up the difference between the "economic" rent—that which would enable the project to meet maintenance, amortization and interest costs—and the "social" rent—that which the slum dwellers in the lower-income brackets can afford to pay.

The act gives the Administrator general control of all projects standards and limits the amount which can go to any one locality. Each State is limited to 10% of the total funds in any one year, and each community must put up 10% of the initial cost of any project.

Only families of lower incomes are eligible to live in the projects.

Mr. Straus, who is to receive a salary of $10,000 per year out of $1,000,000 provided for administrative expenses, has long been an authority on low-cost housing and slum clearance. He is the author of a number of monographs on the subjects, and since March 25, 1936, has been a member of the New York City Housing Authority. He made a seven-weeks' survey of housing conditions in European cities in 1935, at the request of Mayor La Guardia, and has frequently been consulted by President Roosevelt.

He was born in New York on May 27, 1889. He became associated with R. H. Macy & Co. in 1910 and three years later was made a partner. In 1914 he bought Puck, a magazine of humor, and edited it for three years until his enlistment in the United States Navy. He saw war service and was honorably discharged as an ensign. In 1919 and 1920 he was assistant editor of the old New York Globe.

Mr. Straus was elected State Senator on the Democratic ticket in 1921 and served until 1926. He was active in furthering Governor Smith's power program. His voting record won him the approval of the Citizens Union. In 1933 he was a candidate for the Board of Aldermen on the Recovery ticket.

He is a past president of the Park Association of New York, and headed the Hillside Homes low-cost housing project in the Bronx. Mr. Straus is president of the National Straus Foundation, and a director of Abraham & Straus, Inc., Brooklyn department store.

Swedenborg Anniversary Planned

NEW YORK—Plans for the celebration of the 250th anniversary of the birth of Emanuel Swedenborg, to be held next January 29 throughout the United States and other countries, have brought to light Swedenborg's work on house-heating and conservation of fuel. Although best known as a philosopher and theologian, he offered suggestions and diagrams for an improved construction of a household stove for use in Sweden.

The stove, later manufactured and widely used, consisted of a central, pipe-shaped firebox, with a small opening at the bottom, connected with a second outer wall by horizontal crosspieces. Thus an air space was formed all around the receptacle which actually contained the fire, to provide a circulation of the hot air inside the outer wall of the stove. The top and bottom openings could be tightly closed by iron plates and the same fuel would burn for several days.

Nathan Straus, right, newly appointed administrator of the United States Housing Authority, with Secretary of the Interior Harold L. Ickes. Photo by Wide World.

Emotional and Heat Regulatory Sweating Cool Human Body, Make Possible High Work Output Despite Heat, Says Dill

BOSTON—The importance of the properties of water as a regulation of body temperature and in the dissipation of heat was one of the points emphasized in a lecture at Lowell Institute recently by Dr. David B. Dill, associate professor of industrial physiology at Harvard. His topic was "The Physiology of Perspiration." It was second in a series of eight lectures on "Life in High Temperatures and in Great Heights."

"In animals which can maintain a high rate of work output in hot climates there is only one important means for dissipation of heat," Professor Dill said, "and that involves the evaporation of water.

"Two properties which render it so valuable in the regulation of body temperature are its high heat capacity and its high heat of vaporization," Professor Dill continued. "Heat is transported by the blood from the tissues where it is produced to the lungs or skin where it is dissipated," he said. "The blood, like other tissues, has a high heat capacity and can transport a large quantity of heat for a given circulation rate."

A second point emphasized was that in man the areas where heat is to be dissipated are abundantly provided with sweat glands. "These glands," he said, "are made to work through the nervous system, when other channels of heat elimination are inadequate. However, while the sweat glands provide the chief avenue by which water reaches the surface of the skin, a considerable amount constantly is passing through the skin in some other manner.

"In contrast to the passive nature of the insensible loss of water through the skin, the sweat glands are subject to nervous control and vary widely in their level of activity.

"There are two kinds of sweating, emotional and heat regulatory. We are all familiar with the 'cold sweat' of emotional disturbances. It has been shown that the sweat glands of the palms and the soles are always active, and that emotional stimuli may cause a sudden increase in sweat production in those areas.

"It is possible that racial differences may exist in the distribution of areas subject to emotional sweating, for the occurrence of 'beads of perspiration' on the face is symbolic of emotional stress among people of European origin."

Summing up several points, Professor Dill said "sweat varies in composition, depending upon its rate of production. Its composition appears also to be influenced by external temperature, physical activity and degree of exposure to the sun.

"In hot weather salt depletion is high, not only because of the large volume of sweat produced, but because this sweat is unusually high in salt content."

In conclusion, after noting that some people lag behind others in sweat production and consequently undergo sometimes an unpleasant increase in body temperature, Professor Dill said "adaptation to high temperature involves an increased capacity to produce sweat, a greater sensitivity of the temperature regulatory apparatus and an economy of salt." The effectiveness of adaptation varies from one person to another.

Conditioning Reduces Accidents, Safety Engineers Told

KANSAS CITY — Air conditioning has done much to promote the health and comfort of workers, not only in maintaining comfortable temperatures, but also in eliminating accident and disease hazards, delegates to the refrigerating section of the National Safety Congress were told today by A. G. Hillen, engineer, Carrier Corp. This was brought out in Mr. Hillen's address on "Safety Control in Air Conditioning."

Mr. Hillen said that there are a number of applications in which air conditioning has proved itself to have a definite safety value. In the operating rooms of hospitals where air conditioning is installed, the doctors and nurses are comfortable, which tends to increase steadiness of the nerves. Freedom from perspiration avoids possibility of a wound infection from that source. Since many anaesthetics have explosive characteristics, maintenance of a relative humidity of 50% eliminates possibility of a disastrous static condition.

Deep mines, without air conditioning, have temperatures and humidities that are excessive, frequently causing prostrations. In shallow mines, with a year-round temperature of about 50F the induction of moist summer air for ventilation causes condensed moisture to accumulate on the shale rock, increasing the hazard due to falls. By supplying air that is dehumidified, condensation will not occur and disintegration and falls are minimized.

Many air conditioning installations in industrial plants where excessive heat is generated have reduced the number of prostrations, benefited the health of workers, and increased production. Another important safety application is for the removal of dust and small particles of irritant chemicals such as are found in match factories and in some departments of chemical, paint, and pharmaceutical plants.

Fuse loading departments in ammunition factories is another application where air conditioning promotes safety for employes. The humidity is kept high enough to prevent a static spark that might cause disastrous results and the elimination of perspiration prevents the powder from adhering to the steel dies.

Chicago to Enforce Smoke Law

CHICAGO—An amendment to the smoke ordinance of Chicago was passed last summer. It provides for the annual inspection of fuel-burning equipment by the department of smoke inspection and abatement, and sets up a schedule of fees for the inspection based on the capacity of the equipment.

The amendment also provides for the revocation of the certificate allowing operation of the plant if it is found, on inspection, that the equipment is in such condition that it cannot be operated without the emission of dense smoke in violation of the provisions of the ordinance.

It is expected that the enforcement of the amendment will result in the rehabilitation of heating equipment that has been allowed to deteriorate. A considerable revenue is also expected, as approximately 30,000 buildings are subject to the annual inspection requirements.

ASHVE Investigates Heat Losses

BIRMINGHAM, ALA.—Three new chapters at San Francisco, Des Moines, and Atlanta, have been added to the ASHVE, bringing the number of chapters to 25 with a total membership of 2687, said D. S. Boyden, national president, in addressing Birmingham engineers October 12. Efforts are being made in Birmingham to organize an Alabama chapter. C. P. Lichty, C. P. Lichty Engineering Company, served as chairman at the meeting.

President Boyden said that the Society now has several surveys under way, one relating to heat losses from windows and glass brick fronts, another on friction losses in ducts, and another to determine a measure for the velocity of air streams. Mr. Boyden said that experiments so far showed that higher velocities may be used than at first thought possible for comfort. He added that the Society had cooperative agreements for research with 10 universities.

While here Mr. Boyden delivered an illustrated lecture on "The Economic Use of Purchased Steam."

Boyden Explains District Heating, Reviews Society's Activities

NEW YORK—A modern district heating system has an overall thermal efficiency of 63% according to D. S. Boyden, national president of the ASHVE, who addressed the New York Chapter of that organization October 18. This compares, he said, with efficiencies of 50% for small isolated heating plants and 60% for medium size plants. The subject of Mr. Boyden's address was "The Economic Aspects of District Heating and Purchased Steam."

The speaker pointed out that district heating began in 1877 when electric utilities began selling exhaust steam for heating at byproduct rates. At that time the lines were of screwed pipe, there were no reliable meters, and charges were made on a flat rate basis. With the introduction of condensing engines and turbines, use of exhaust steam for heating was dealt a severe blow.

A permanent problem of the district heating utility, Mr. Boyden said, is to keep investment and other fixed charges low enough so that district steam can compete with the isolated plant in spite of its low annual load factor. The investment in a district heating plant is from $2 to $4 per pound of steam capacity; of this, the cost of the distribution lines is from 70 cents to $1.35. The cost of installing steam mains is high, totaling about $37.32 per lineal foot for a 12-in. underground main. This cost is made up of $9.08 for pipe, valves and fittings; $4.84 for insulation; $5.06 for excavating and filling; $3.29 for concrete work; $6.25 for paving; $3.50 for engineering, and $5.30 for extras.

President Boyden, following his introduction by Walter E. Heibel, president of the New York Chapter, presented Henry G. d'Issertelle, New York consulting engineer and a charter member of the New York chapter, with a Life Membership in the ASHVE.

In reviewing the accomplishments of the Society, President Boyden reminded his audience that the ASHVE was the only organization of its kind with its own Research Laboratory. Since the inception of the Laboratory in 1918 the Society has spent $600,000 on research. The results have been published in 175 papers presented at annual and summer meetings.

Three new chapters of the ASHVE were formed in the past year. These are at Atlanta, San Francisco, and Des Moines. The Society now has 2687 members with 65 applications pending.

Heating Equipment Announced by York and Westinghouse

NEW YORK—Two manufacturers who heretofore have made only summer and year-round air conditioning equipment announced during October their entrance into the residential air conditioning market with a line of heating equipment.

York Ice Machinery Corporation entered the automatic heating field with an oil-burning boiler, this being the company's initial step in its plan for a complete line of residential heating equipment. The line eventually is to include oil- and gas-fired boilers for use with split system conditioning and also a line of gas- and oil-fired furnaces. However, the company will not enter the conversion oil burner field.

Westinghouse Electric and Manufacturing Company will also enter the home air conditioning market according to P. Y. Danley, manager of Westinghouse's refrigeration and air conditioning department. Entitling its equipment "packaged" units, this company employs a central system of matched units comprising a forced warm air furnace, condensing unit and cooling coil, filters, blower and humidifier, all in a single package. Gas- and oil-fired furnaces in a number of sizes are announced. Distribution will be through franchised dealers beginning about the first of January.

73F to 75F Recommended for Rooms with Exposed Walls; Bacteria Numerous in Schools, Pollution Study Shows

NEW YORK—Dr. C.-E. A. Winslow of Yale University outlined the requirements for heating in connection with low cost housing, at a symposium on "The Hygiene of Housing" presented October 8 by a committee of the American Public Health Association. The symposium was one of the features of the convention of the public health men, held the week of October 4-8 here.

Doctor Winslow pointed out that in low cost housing there was probably no need for ventilation other than open windows, but that the requirements for heating necessitated a first class mechanical installation. He said that, although 70F is the standard inside temperature for rooms heated in the winter, nevertheless higher temperatures are necessary where there are one or two exposed walls, and perhaps 73F to 75F might be a necessary indoor temperature.

In connection with this Doctor Winslow said that perhaps one of the reasons why Americans suffer from so many respiratory diseases is due to the fact that these high indoor temperatures are maintained, and pointed out that probably the fewer cases of such diseases reported in England is due to the relatively low temperatures carried indoors there.

Doctor Winslow summarized the essential hygienic features of low cost housing from a standpoint of heating and ventilation as follows:

1. Provision of a cubic capacity of 500 cu. ft. of space for each adult and 250 cu. ft. for each child in every occupied room.
2. Construction, which provides such a degree of insulation as is economically warranted by local climatic conditions and fuel costs.
3. Installation of heating appliances (circulating heater stoves in the isolated dwelling and one-pipe steam heating in blocks of tenements) adequate to maintain a dry bulb temperature of 68F to 70F in rooms for day occupancy. Sleeping rooms can be advantageously heated by radiation for temporary purposes.
4. Local ventilating flues to remove heat and fumes from the range and from any heating sources which involve danger of carbon monoxide production.
5. Provision of at least one electric fan for cooling where summer heat is considerable.

At a session on public health engineering it was revealed that a study of bacteria in the air of several types of locations in New York City showed that the streptococci that infect human throats were more numerous in schools than in any other location. This report was the result of a study carried on under the auspices of the DeLamar Institute of Public Health, College of Physicians and Surgeons, Columbia University, WPA, and the New York City Department of Health. The report was presented by Dr. Leon Buchbinder, Mathilde Soloway, and Morris Solotorovsky.

The report does not conclude that the bacteria in the air are directly responsible for human infections. Such conclusions, it was pointed out, must await still further studies. The facts found so far, however, show distinct correlations between the amount of air pollution and the number of human beings present in the locality, according to the report.

The subway was a close second in number of positive samples obtained, but the average number of streptococci for all samples in the subway was proportionately lower. Streets, non-air-conditioned theaters, air-conditioned theaters and the parks followed in decreasing order.

At this same session on public health engineering, Dr. W. F. Wells summarized the recent results of his continued study on air-borne infection. Doctor Wells demonstrated his equipment for measuring the presence of intensity of air-borne virus. He also discussed methods developed by him whereby he hopes to be able to establish a definite standard of the killing-power of ultra violet rays similar in nature to the candle-power as a unit of light intensity. Doctor Wells also described in general some of the installations of ultra violet lights in air now in use, including installations made in isolation wards in children's hospitals and in operating rooms. Discussion from the floor brought out the fact that there is every reason to believe that Doctor Wells' methods and findings will have wide practical applications.

Dr. C. P. Yaglou presented a paper in which he summarized the physical and physiological principles of air conditioning. Dividing his subject into two parts, he first discussed winter air conditioning and then summer air conditioning. He reviewed much of the experimental work which has been done on the health phases of the subject and outlined studies now being conducted but on which no reports have been published.

Drinker, Snell, Speak at Boston

CAMBRIDGE, MASS.—Members of the Boston chapter, ASHVE, met at the Harvard School of Public Health October 21. The speakers were Professor Drinker of the Department of Public Hygiene, Harvard School, whose subject was "Atmospheric Pollution in Air Conditioning," and John Raymond Snell, research fellow in sanitary engineering, who talked on "Ventilation of Moving Picture Booths."

Steam Heat Used in Ancient Villa

LONDON — According to *The Heating and Ventilating Engineer*, well-preserved ruins of a Roman villa, built at least 1800 years ago, have been unearthed in the heart of Vienna. Workmen excavating parts of the Wipplingerstrasse unearthed Roman brickwork. Investigation revealed the complete floor structure of a Roman villa, consisting of six rooms and what appeared to be a kitchen.

Weapons were found, and tiles bearing signs indicating that its tenant must have been an officer of the Roman 10th Legion, which was stationed in ancient Vindobons, one of the last outposts of the Roman Empire.

Underneath the floors, leading from the kitchen, was a complicated system of pipes whose object was to bring hot steam into spaces beneath the floors and thus heat the building.

Chicago Power Show Sets Record

CHICAGO—The Chicago Exposition of Power and Mechanical Engineering, held at the International Amphitheatre here October 4-9, was one of the most successful events of its kind ever held in the midwest. The attendance for the week was 26,142.

One hundred and fifty-three exhibitors cooperated to present an exposition characterized by dynamic displays featuring equipment in operation. The displays were so arranged that points of construction and operation could be easily grasped and appreciated by the observer. Coincident with the exposition the Chicago chapter of the ASME arranged a dinner meeting at the Saddle and Sirloin Club, which is near the International Amphitheatre, on the evening of October 7. This event was held jointly with the Chicago section of the American Institute of Electrical Engineers, Western Society of Engineers, and Chicago Chemists' Club.

Bailey Receives Honorary Degree

BETHLEHEM, PA.—Lehigh University, at its Founder's Day exercises October 6, conferred the honorary degree of Doctor of Engineering upon E. G. Bailey, vice-president of The Babcock & Wilcox Company, and president of the Bailey Meter Company, for "notable and distinguished accomplishment in the field of combustion and steam engineering."

Chemical Engineers to Confer at Penn on Drying and A. C.

PHILADELPHIA — Plans for the Fourth Chemical Engineering Symposium on Drying and Air Conditioning to be held at the University of Pennsylvania here December 27-28 are practically complete. The program will follow closely that of previous symposia, providing two full days of technical sessions, group luncheons, and an evening dinner.

It is a particularly appropriate time to meet in Philadelphia. The University of Pennsylvania is to celebrate its 200th anniversary in 1940 and begins this month an elaborate series of meetings leading up to that event. It is anticipated that many visitors will find the symposium and the celebration a double attraction to Philadelphia in December.

All meetings will be held in Houston Hall, first student university building in the United States. Luncheons and dinner will be served in that building. Further information may be obtained by addressing Prof. N. W. Krase, Room 112, Engineering Building, University of Pennsylvania, Philadelphia.

It is of interest to recall that the University of Pennsylvania has had an undergraduate curriculum in chemical engineering continuously in its catalog for a period longer than any other school. As a result of reorganization in the fall of 1936, graduate work leading to the Ph.D degree in chemical engineering is now in progress. Laboratory space and facilities have been greatly improved during the past year.

A.C. System Has Gold Ductwork

NEW YORK—Ducts decorated in gold finish feature the air conditioning installation in the Chinese porcelain and antique galleries of Edward I. Farmer at 16 East 56th St., New York.

The system was installed for comfort of the private collectors and art connoisseurs who come to the gallery from all parts of the world. These "gold" ducts, the passageways which carry the conditioned air from the main equipment to the outlets, harmonize with the oriental furnishings and decorations of the studio. A Carrier Weathermaker conditions three attractive showrooms, executive and general offices and hallways.

Springfield Has Burner Price War

SPRINGFIELD, MASS.—Flagrant price cutting on oil burners here is blamed by Reginald K. Swett, president of the Springfield Oil Burner Dealers' Association, for a considerable gain for gas heating.

One manufacturer, according to Mr. Swett, has sometimes bid $100 to $150 below his competitors. This has led to a wide price structure and the public will no longer accept the initial price. They play one dealer against another until they get their own price. At the same time a Springfield chain store outlet started advertising oil burners for $149 installed.

But the worst blow was when a dealer announced he would install an oil burner in the home for the cost of installation, which was less than $100, provided the homeowner purchased oil from him at the prevailing market price over a period of five years, Mr. Swett said.

Mr. Swett claims that the price war by oil burner dealers aided the local gas utility, which stepped into the heating field and, in less than two months, took away more than 50 heating jobs.

During these two months, Mr. Swett continued, the gas company did a fine job of merchandising. Newspaper advertising contained testimonials from satisfied customers.

Oil burner dealers could have prevented these inroads on their business had they stayed away from a price war and maintained their prices as the association had urged, he said.

Pitt Starts Research Program on Effects of Heat on Humans

PITTSBURGH — The Westinghouse Electric and Manufacturing Company has given $50,000 to the University of Pittsburgh School of Medicine to support a three-year program of research in fever therapy, according to the American Medical Association. The study will provide data on humidity and temperature as they affect the human body.

Aims of the study are:

1. To make fever therapy facilities more readily available in the Pittsburgh district.

2. To conduct concentrated clinical investigations into the further treatments of diseases using this method, chemical methods and combinations of the two and to make studies on a variety of disease including those now treated with fever and others.

3. To make a critical study of all means of creating fever in an effort to discover the safest, simplest method with respect to mechanical operation, reliability, safety and in predetermined atmospheric environments.

4. To accumulate more knowledge concerning the reactions of micro-organisms to their environmental conditions, particularly their reactions to heat, including virulence, multiplication, growth and death.

5. To train personnel and to provide information for the medical profession and the public concerning the value of this type of medical procedure.

6. To make data of these studies available in determining proper atmospheric conditions among industrial workers as well as serving as a medical study for the comfort of man.

The study will be directed by the department of industrial hygiene of the school of medicine and affiliated hospitals. Hospitals in this group not already having fever therapy apparatus will install equipment within the next few months.

Auditorium A.C. Patents Described

BOSTON—The first fall meeting of the Air Conditioning Bureau was held Thursday evening, October 28, at the Boston Chamber of Commerce. Herman Seid, New York, patent and engineering counsel for the Auditorium Conditioning Corporation, spoke on "The Patent Systems of the Auditorium Conditioning Corporation." He spoke primarily as an engineer, presenting and illustrating well known bypass systems and many others covered by the Auditorium patents, with a brief review of the latest developments in air conditioning.

Chicago Adds 60 A.C. Installations

CHICAGO—Commonwealth Edison Company reports 60 air conditioning installations added to the company's lines during September. Twelve of these, totaling 243½ tons, were central systems which with four-room cooler installations made a grand total of 246½ tons added.

The largest installation was a 75-ton store system, followed by a 50-ton installation in the offices of A. C. Neilsen, Inc.

Houston Reports Seven A.C. Jobs

HOUSTON, TEX.—The sales promotional division of the Houston Lighting & Power Company, reports two central air conditioning installations during September. One, a 16-ton job, was for the Crown Central Petroleum Corporation; the other, 6-ton, was for the Poll-Parrott Juvenile Shoe Store.

Five portable air conditioning units were sold during the month, one of ¾ hp., and the remainder 1 hp. each.

Sunspot Maximum Expected in 1939, Astronomer Reports; More Ultra-Violet Radiation Also Predicted by Andrews

WASHINGTON—Are men the puppets of sunspots? Do these titanic whirlwinds in the atmosphere of the sun which increase and diminish in number through a continuously recurring approximate 11-year cycle have an indirect but powerful effect on weather, crops, the stock market, politics, war, and peace?

These questions are discussed, somewhat skeptically, by Loring B. Andrews, Harvard University astronomer, in the annual report of the regents of the Smithsonian Institution issued late in October. The report is composed of authoritative articles by eminent authorities on recent accomplishments in the whole field of science from physics to ethnology.

The number of these whirlwinds passing over the face of the sun is now increasing. It should reach its maximum in 1939. Certain terrestrial effects, Mr. Andrews points out, confidently are to be expected. There should be more brilliant displays of the northern lights, more intense magnetic storms, and various disturbances in long-distance radio transmission. These are due directly to the sunspots themselves. Each one of them acts as a titanic cannon, firing electrically charged particles into space. Many of these enter the atmosphere of the earth.

Beyond this everything is more or less guesswork. Superficially at least, one may find approximate 11-year cycles, corresponding roughly with the sunspot cycle, in numerous biological and social phenomena. It is difficult to establish the validity of any such cycles, however, because there is such a large field of selection in assembling data. Correlations with sunspots, if they exist, are indirect. Mr. Andrews presents the evidence, such as it is, without making any claims for it.

During a sunspot maximum the earth receives more solar heat. Paradoxically enough, Mr. Andrews points out, this means lower terrestrial temperatures. The more heat from the sun the more water is evaporated from the oceans, hence more clouds, hence less radiation falling on the planet's surface. There also should be more rain over most of the earth.

Observations to date seem to support this theory. So many factors are involved in weather, however, that it is impossible to make any hard and fast statements.

Also during a sunspot maximum there is more ultra-violet radiation from the sun. This is believed to act as a stimulus to growth. Combined with the more abundant rain, this would tend to make a more luxuriant vegetation over most of the earth in such a period. Studies of tree rings, each of which represents the growth of the tree during a year, seem to bear this out. They increase and diminish in width in an approximate 11-year cycle.

There is also an approximate 11-year cycle in the abundance of certain northern fur animals, which has been attributed to the ultra-violet light variation. The effects of this radiation on animal life are far from completely understood. Conceivably it acts as a nervous stimulant. It might possibly, for instance, make human beings more ambitious and more irritable.

Says Mr. Andrews: "Russian scientists suggested not many years ago, and I have seen the same statement made independently at a more recent time, that great international crises, such as wars, peace treaties, and other evidences of international amity or friction, follow the period of sunspot activity with some fidelity. The basis for such a correlation may be sought in the stimulating effects of ultra-violet light, prodding statement to great international concords, or, in its irritating effects, annoying them until they come to blows. The sole difficulty with the correlation and with its theoretical explanation is that the world seems to be in a state of international upheaval at almost any hour in any year.

"A correlation of great human interest is that of sunspot activity with stock market transactions and with the price of grain, wheat, cotton, and other major items of exchange, the oft-discovered correlation that prompts many letters. It is conceivable that the stimulating effects of ultra-violet radiation upon humans should have much to do with the periods of prosperity and depression, and with the flux of prices, not only of stocks and bonds, but of staple commodities. Those who bear the brunt of furnishing advice to investors and wholesalers have been enthusiastic in their search for such a correlation between solar activity and terrestrial activity. Needless to say, they have found evidence of such a correlation. As the number of sunspots mounts, prosperity turns the corner; as the number of sunspots diminishes, prosperity hides itself in a depression. It may be pointed out that the last sunspot maximum occurred in 1928, an epoch in the economic history of the United States to which one commonly refers as 'the good old days.' The last sunspot minimum occurred in 1933. Someone has mentioned an economic depression similarly dated. It is now said that conditions are improving and that prosperity is again just around the corner; sunspots are improving in number as well. The correlation seems amazingly satisfactory, and its amazing properties are enhanced by the fact that it holds equally good over nearly the past two centuries."

Manufacturer Offers A.C. Course

CHICAGO—A practical training course dealing with the problems of selling, installing, and servicing air conditioning equipment will be sponsored by Fairbanks, Morse & Co., at the company's plant in Beloit, Wis., during October. Graduates of colleges, technical schools, and high schools who want to fit themselves for work in the rapidly expanding air conditioning field are eligible to enter, it was announced by the Chicago office of Fairbanks, Morse & Co. There will be no tuition charge. The school will be open the whole month.

3 Boston A.C. Installations Made

BOSTON — Three air conditioning installations, totaling 96 hp., are reported by Boston Edison Company for September in its territory. They are one of 78 hp. for the Brookline Theatre and one each of 12 and 6 hp. for Hayes-Bickford lunchrooms, including a new location now being finished.

Britain to Condition Art Gallery

LONDON—It has been decided to air condition the National Gallery, which houses Britain's greatest collection of art treasures. This long overdue reform came before the trustees for formal approval on October 12. The installation will be in three sections and will cost approximately $100,000, including a $50,000 refrigerating plant.

It has been found possible to lay all the ducts along the outside of the building. This decision has substantially reduced previous estimates of the cost, and will also enable the Gallery to remain open to the public throughout the installation.

Once the Gallery is air conditioned it will be possible to remove from the pictures the glass which until now has been their only protection from the inroads of the heavy London fogs. Dark pictures like those of Rembrandt, which are practically invisible today behind their glasses, will gain the most from this liberation.

Reports on air conditioned galleries in the United States have been obtained and will be considered by the trustees before the final details of the installation are adopted.

A.C. Will Benefit Health of Public, Dr. Arnold Tells Chicago Group

CHICAGO—The speaker of the evening at the fall meeting of the Illinois chapter, ASHVE, which was held October 11 at the Brevoort Hotel, was Dr. Lloyd Arnold, professor of bacteriology and public health, University of Illinois College of Medicine, and bacteriologist of the State Department of Public Health, Chicago. Doctor Arnold's address was on "Influence of Air Conditioning Upon Public Health."

Doctor Arnold stated that a healthy person is one who is adjusted to his environment. His various physiological systems, such as respiratory, digestive, etc., coordinate with each other in a normal manner if he is in perfect equilibrium with the forces in his environment. One of the important environmental factors for man is the physical and chemical properties of the air.

The speaker explained that man's skin is a part of his heat regulatory system. Man has a set of sweat glands the purpose of which is to secrete large volumes of water onto the surface of the skin for cooling or reducing internal temperature. When the skin contains an increased amount of blood, as it will on a hot and humid day, the capillary beds along the alimentary tract contain less than the usual amount of blood, and the individual is more subject to digestive ills. The opposite reaction takes place on a cold day. The skin allows less than the normal amount of blood to pass through it in order to conserve body heat and the capillaries in the stomach, intestines, liver, etc., contain an increased amount of blood. Under such conditions the digestive tract is in a state of excellent physiological function.

In the respiratory tract, when the skin is suddenly chilled the nasal capillaries contract. In a healthy person they again dilate within five minutes to warm and moisten the incoming air. The individual suffering, however, from repeated head colds has a sluggish nasal reflex and changes in skin temperature are not compensated for by alterations in nasal circulation. People with hay fever and asthma also have a very unstable circulatory reaction.

Artificial air conditioning should create such an environment that the body would not be called upon to use its skin to make these various adjustments and thereby upset the internal organisms. In this way, Doctor Arnold concluded, the health of the public can be benefited by air conditioning. At the same time, unless air conditioning creates gradual changes it can also be detrimental to the health of the public. The problem is one of adaptation to changes in atmospheric temperature and humidity.

At the conclusion of the doctor's paper and discussion thereon, President Ries announced that it was necessary for him to resign because his work has taken him from Chicago to Oberlin, Ohio. This resignation automatically stepped up S. I. Rottmayer, vice-president, to the office of president and left the office of vice-president to be filled by nominations from the floor. John Howatt nominated J. R. Vernon for vice-president. There being no other nominations, J. R. Vernon was named to appear on the ballot to be sent to members and counted at the next meeting.

Porter Praises Burner Dealers

WASHINGTON—G. Harvey Porter, managing director of Oil Burner Institute, was the principal speaker at a meeting of the Oil Burner Group of the Merchants and Manufacturers Association of Washington, on October 5.

Mr. Porter outlined the regional plan of OBI for cooperation of outlets in key markets and complimented the Washington Group for maintaining satisfactory competitive marketing conditions over a long period of time. The group then conducted an interesting discussion of the methods and experiences that had served to improve that market for Mr. Porter's use in other key market contacts.

OBI to Open Oil Heating Exhibit on Permanent Site in Radio City

ATLANTIC CITY—The board of directors of Oil Burner Institute held its quarterly meeting at the Chalfonte-Haddon Hall October 11. President C. N. Lockwood outlined the details of the proposed permanent oil heating exhibit at Radio City, New York, and discussed the many advantages that would occur from such an educational display for the public under the sponsorship of the oil burner and fuel oil industries. The board approved the project and several members present indicated their intention to participate. Details of preparation of the Exhibit are in the hands of the Institute's executive committee and Lionel L. Jacobs, chairman of the public relations committee. It is expected that the exhibit will open about the middle of January.

G. W. Wynne, Roger William Riis & Associates, publicity council, reviewed the publicity program of the Institute and outlined a plan of activities which would be undertaken to keep the public informed of the values of oil heat.

G. Harvey Porter, managing director of OBI, reported that a pamphlet was in preparation for the use of dealers and salesmen in combating unfair and untruthful statements by competitive fuels. He also reported steady progress in the objectives of the Institute's regional plan of contact for the improvement of trade practice conditions in key markets.

The meeting was attended by E. P. Bailey, J. A. Berghoff, W. F. Brannan, C. H. Chalmers, J. J. Donovan, C. S. Dieter, L. L. Jacobs, Lawrence Knapp, A. F. Reif, C. E. Shields, H. F. Tapp, J. H. Van Sciver, Mr. Lockwood, C. F. Curtin, assistant secretary. G. B. Ferris, attorney for the Institute, Mr. Porter and Mr. Wynne.

A. C. Courses Start at Columbia

NEW YORK—Columbia University has announced its evening courses in air conditioning for the season of 1937-38. The course is divided into two parts, Air Conditioning I which will be given from September to January, inclusive; Air Conditioning II which will be given from September to January, inclusive, and also from February to June, inclusive. Air Conditioning I will be given by R. W. Waterfill, Buensod-Stacey Air Conditioning, Inc., and Air Conditioning II by Claude A. Bulkeley, chief engineer, Niagara Blower Co.

The first course is a study of steam air mixtures, comfort cooling calculation, study of refrigerants and analysis of refrigeration equipment. The second course deals only briefly with fundamental principles and develops the theory and practice of design and practical operation. Further information can be obtained from the Director of the University Extension, 561 W. 116 St., New York.

Herske Inducted by N.Y. Builders

NEW YORK—The New York Building Congress, Inc., has inducted into office 15 new members of its Board of Governors. These are: Arthur R. Herske, American Radiator Co.; Thomas B. Breen, The New York Roofing Co.; John J. Brennan, Building & Construction Trades Council; F. P. Byington, Johns-Manville Corp.; Fletcher Collins, Wrought Iron Pipe Association; Lawrence B. Cummings; M. W. Del Gaudio; James W. Escher, White Construction Co., Inc.; Robert A. Goeller, Hatzel & Buehler, Inc.; Robert Louis Hoguet, Emigrant Industrial Savings Bank; John W. Pickworth, Weiskopf & Pickworth; Alfred Rheinstein, Rheinstein Construction Co.; Charles A. Selby, Wininger & Selby, Inc.; Carl M. Snyder, General Electric Co., and E. M. Van Norden, Consolidated Edison Co.

A.C. for Ten St. Louis Apartments; Omaha Conditioning Increases

ST. LOUIS—Ten new apartment house buildings here have contracted for complete year-round air conditioning and a number of these have been completed and are ready for occupancy, according to the Union Electric Company of Missouri.

First installation of this type in St. Louis—and presumably first in the United States—was a three-story, six-apartment building constructed during October, 1936, ready for occupancy in March, 1937, and now fully rented. Individual units are installed in a small closet-like space in each apartment, supplied with hot water in the winter from a boiler in the basement, with cold water in the summer from a refrigerating machine in the basement. Piping system is concealed in the walls and units are provided with automatic, separate controls.

Substantial increases in air conditioning installations are reported by Omaha and Lincoln, the two largest cities in Nebraska.

The Nebraska Power Company, reporting for Omaha, lists 91 new installations totaling 1451 hp. for the first six months this year, as against 88 installations totaling 1300 hp. for all of 1936. Iowa-Nebraska Power Company, Lincoln, reports its commercial air conditioning load totals 3000 hp. at the present time, as against 1000 hp. at the end of 1936. Largest of the new installations in Lincoln is the 12-story Stuart building, totaling 700 hp. This building is equipped for year-round air conditioning with 450 individual room conditioners, which permit individual control by the tenants.

Doctors Study A.C. for Hay Fever

BUFFALO—A practical study of the effects of air conditioning on allergic conditions of the respiratory tract has been arranged by the chairman of the committee on public health of the Medical Society of the County of Erie. Three rooms of a model home on the main floor of the Electric Building, Buffalo, conditioned to a degree that pollen is almost entirely removed from the air, will be used for the study, which will last six weeks, coinciding with the hay fever season. The rooms will accommodate 12 patients, and nurses and attendants will be present.

A report will be presented at a later meeting of the society.

Exports of A.C. Machinery Rise

WASHINGTON—Rapid expansion of foreign sales of air conditioning equipment was indicated by figures made public September 2 by the machinery division of the Department of Commerce, which showed such export sales for the first six months of this year valued at $704,756, compared with $863,482 for all of 1936.

In 1935, which was the first year in which export figures for air conditioning equipment were segregated, the exports totaled $320,558. The value of the exports for the first half of this year were 89% ahead of the value for the first half of 1936. The Union of South Africa and Argentina were the best foreign customers.

Southern Utility Promotes Gas

JACKSON, MISS.—A gas heating campaign has been launched by the Mississippi Power & Light Company and associated appliance dealers with the slogan "Cruise to comfort in 1937 with automatic natural gas heat." This state is well supplied with natural gas from the Monroe, La. and the Jackson, Miss., fields.

Featured appliances in the campaign include gas fired boilers, warm air furnaces, floor furnaces, gas steam radiators, circulating heaters, conversion burners, winter air conditioning units, and chill chaser space heaters.

Westinghouse Trains 70 Engineers in 25-Day Advanced A.C. Courses

EAST SPRINGFIELD, MASS.—To provide trained engineering personnel for more intelligently cultivating the fast expanding air conditioning market, an air conditioning application engineering school for distributors was held here October 4-29.

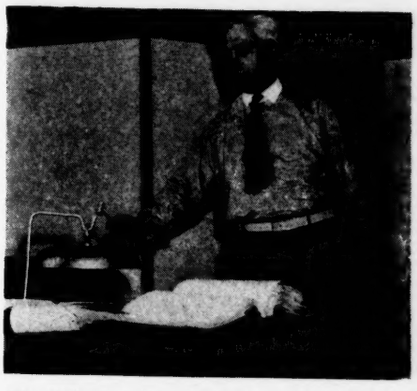
Much time and study were given to the formation of the school as it was not intended merely as a training in the fundamentals of air conditioning; it was a laboratory for training in advanced principles of engineering and application. The school was a four-week concentrated program covering all phases of the subject—engineering, application, and technology. Materials used included drawings, diagrams, charts, and computation tables. The instruction courses, consisting of both theory and practice, solved problems which are encountered under actual working conditions such as estimating, installing, and the proper selection of materials.

Included among the guest speakers at the school were C. S. Leopold, Philadelphia consulting engineer; Dr. E. Vernon Hill; F. M. Young, president, Young Radiator Co.; W. B. Henderson, executive vice-president, Air Conditioning Manufacturers' Association; J. H. Mabley, engineering department, Mechanical Heat and Cold, Inc., Detroit; and L. W. Chubb, director of research for Westinghouse.

W. C. Goodwin, supervisor of application engineering for the Westinghouse air conditioning department, was in charge of the course. Other Westinghouse instructors were R. C. Bonthron, headquarters syndicate representative; B. C. Davison, application engineer, commercial refrigeration department; L. G. Huggins, supervisor of products division, air conditioning department; H. A. Baer, air conditioning sales; P. J. Zilles, supervisor air conditioning service; R. E. Holmes, and H. A. Blair.

Group of students at work at the Westinghouse air conditioning school.

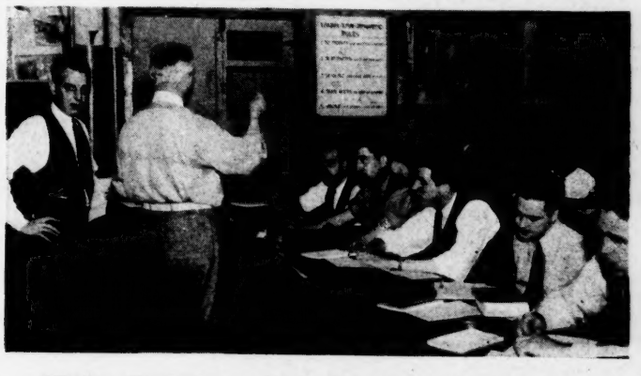
Student Knute Helsing gets a little private instruction from W. C. Goodwin



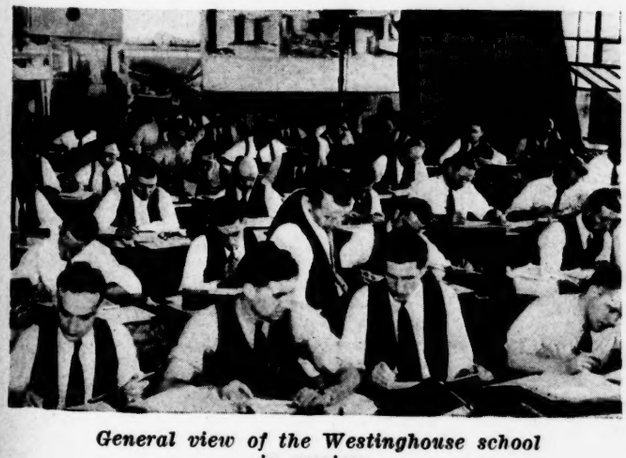
Head Instructor Goodwin rings the bell officially opening Westinghouse school.

Students fresh from classroom watch a condensing unit put through its paces.

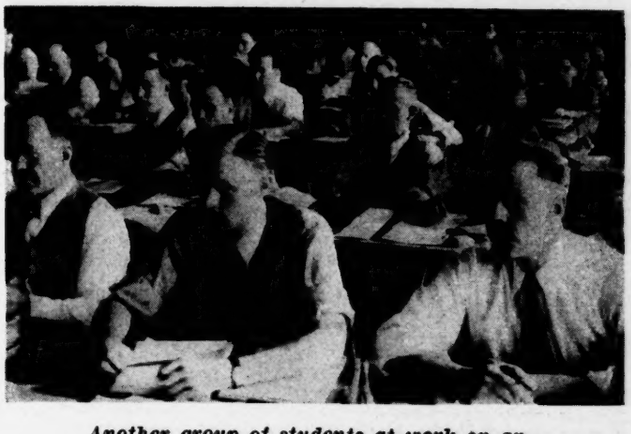
"And you measure from here to here," demonstrates Westinghouse's R. C. Bonthron.



Walter Goodwin, engineer in charge, lecturing on heat gains and losses.



General view of the Westinghouse school in session.



Another group of students at work on an application problem.

Ultra-Violet Rays Give Air Energy, Dr. Winslow Tells Canadians

TORONTO—That the presence of even slight odors in the air of occupied spaces has the effect of diminishing appetite and that a mysterious form of meta-stable-oxygen, said to be caused by the passage of ultra-violet rays through the air, may impart an energy state to the atmosphere which has a favorable physiological reaction and may help scientists in discovering why outdoor air under certain conditions possesses an invigorating quality, was stated here October 12 by Dr. C.-E. A. Winslow, professor of public health of Yale University, in an address before the local chapter of the ASHVE.

Meta-stable-oxygen is atmospheric oxygen which has undergone a little-understood molecular change caused by ultra-violet rays. The phenomenon is believed to be related to the process of ozone formation and is thought to impart to the air an energy state that causes a favorable physiological reaction.

Although asserting, with reference to the new oxygen theory, that "we may be wary of the temptation to hope for too much from this assumption," Doctor Winslow said that in recent years many suggestions have been made as to the possible subtle electro-magnetic influences of the atmosphere and that "it is an alluring hypothesis that some such influence may exist as in dietary hygiene the vitamins have proved of such surprising significance."

In the matter of odors, Doctor Winslow said that their effect of diminishing appetite constituted a phenomenon which has real hygienic significance. Dismissing recent claims that the ionization of air was responsible for an invigorating effect as unproved, he pointed out that in the light of existing knowledge it is obvious that air conditioning in the modern sense is something very much more complex than was connoted by the older term ventilation.

A.C. Totals $71 Million to August

WASHINGTON—Installed cost of equipment sold by the members of the Air Conditioning Manufacturers' Association in August totalled $3,269,792, as compared to $3,621,885 in August, 1936, a decrease of 9.7%, William B. Henderson, executive vice-president, has announced. It was the first decrease of the year below a 1936 comparison period.

"Seasonal trends moved forward this year, the great upturn of March and April coming, for example, at a time earlier than in previous years," Mr. Henderson said. "Another advance is expected for the final quarter of 1937.

The 1937 total now has reached $71,575,967, virtually twice the $36,151,088 attained in the same months of 1936 and 40.3% greater than for all 1936, when the manufacturers reported an installed cost aggregate of $49,942,301.

Downe Addresses ASME Sections

NEW YORK—E. R. Downe, vice-president in charge of research and development, American Gas Products Corporation, discussed the latest research developments in the field of gas heating equipment at a joint meeting of the fuel and power divisions of the American Society of Mechanical Engineers October 19. The chairman of the meeting was H. B. Reynolds, superintendent, motive power, Interborough Rapid Transit Co., and the meeting was in charge of H. A. Cox and E. J. Devlin.

A seminar on air conditioning was held by Junior ASME members October 13. The chairman of the meeting was S. Davidson, Armo Cooling and Ventilating Company, Inc., and the discussion was led by O. B. Schier, II, Consolidated Edison Company. Steps were taken for organizing and developing an air conditioning group for the winter season.

The meeting was in charge of S. Shoor.

Private Building Urged by Laing for U.S. Low-Cost Housing

NEW YORK—The experience gained in England through the construction of 3,250,000 houses since the World War has shown that an effective low-cost housing program can be devised which would provide homes for 85% of the potential small-house market without governmental subsidy, according to John W. Laing, British builder.

Mr. Laing was the principal speaker at a joint luncheon of the New York Building Congress, Inc., and the Committee for Economic and Social Progress, Inc., at the Hotel Astor September 29.

The program suggested by Mr. Laing would involve efficient large-scale operations by high-class builders or companies formed of successful business men to perform a public service; the purchase by the government of large tracts of land at low prices, to be resold to builders at cost; low-interest government loans for the purchase of homes, and recognition by the public of the civic value of home ownership.

The British program, he said, has passed through several stages. At first a large number of houses were built with the help of subsidies. It was found that houses were being built too expensively. Since then architects, builders and workers have cooperated closely, with the result that economical, healthful houses are produced, the builders have adjusted their businesses to house-building, and workers, through steady employment, have become more efficient.

Private enterprise in England now can turn out a home for owner-occupancy for outlays of $4 a week in the provinces and $5 in London, Mr. Laing asserted. This, he said, probably would be the equivalent of $6 a week in this country, and private enterprise here should aim at catering to families with incomes of $24 or more a week. Those with lower incomes probably would be forced to live in rented houses built and maintained by subsidy. He stressed the importance of fixing the line of demarcation between the two classes, in order to remove uncertainty as to what property should be subsidized and the consequent hindrance to private enterprise.

Mr. Laing was introduced by Lewis H. Brown, president of the Johns-Manville Corp., who acted as chairman.

Earnest Explains Institute's Aims

SCRANTON—Sponsored by the American Institute of Mining Engineers, the ASME, the AIEF, and the Chambers of Commerce in the anthracite field, the Joint Engineers' Meeting held here October 9 was addressed by F. W. Earnest, Jr., president of Anthracite Industries, Inc. Mr. Earnest spoke on "The Future of Anthracite."

Mr. Earnest stated that the majority of the 8900 coal merchants selling anthracite fuel are now cooperating in Anthracite Industries' plan. A group of sixty are attending the Second Merchandising School being conducted at the AI laboratory at Primos, and anthracite dealers everywhere are becoming consultants and advisors on all types of domestic and commercial heating problems.

Utility Promotes Use of Stokers

BIRMINGHAM—More than 300 stokers will be sold here this season according to estimates by the Birmingham Electric Co. which is promoting a cooperative campaign with the slogan "Snooze On." Some 50 billboards have been erected and newspaper advertising is being used to push automatic coal heat.

The public is being urged to "keep the home fires burning," with an automatic coal stoker "using Alabama's cheap coal and Birmingham's cheap electricity."

Leading coal stokers participating in the campaign are Clark & Jones, Chas. F. Wheelock & Co., Arnold Supply Co., Ideal Refrigeration and Heating Co., Dexter Fearing Co., and Mason & Dulion.

Chicago to Expand Water Facilities, According to Henderson

WASHINGTON—First action by any city to expand its water facilities following recent publication of a nationwide government study of municipal conditions was reported to the Department of Commerce here today by William B. Henderson, executive vice-president of the Air Conditioning Manufacturers' Association. He revealed that Chicago began laying high capacity mains to enable a change-over from pipes that have served the city's principal shopping section for 83 years.

"This is the start of a series of expansions in Chicago's water supply and disposal capacity that eventually will result in abandonment of a pipe system that first served a reservoir built in 1854 on a spot now the site of a skyscraper in Chicago's financial district," Mr. Henderson said.

"Chicago's conditions are duplicated in some degree in various other cities where the water and sewerage systems have not kept pace with construction and population growth of the past half century or more. Conservation of our natural resources is important even in cities where water supplies are large and rates are low.

"Air conditioning equipment is available that consumes minimums of water in all such circumstances down to as little as five per cent of the amount needed for the system.

"The Department of Commerce survey and Chicago's prompt move toward adjusting its supply facilities to modern requirements will crystallize action in many other cities."

To Cool Indian Railroad Cars 22F

BOMBAY, INDIA — Air conditioned railway passenger coaches are under construction in local shops of two of India's leading railway companies. It is expected that the five specially designed first class coaches being built by the Great Indian Peninsular Railway for the Bombay-Calcutta run will be ready for use by November.

As an experimental measure, the Bombay, Baroda & Central India Railway is equipping one of its coaches with air conditioning apparatus which is expected to keep the temperature from 22 to 27F below that prevailing outside. If the experiment is successful, a regular service will be started for the boat trains to and from Bombay, and on the daily run to Delhi.

The potentialities of the Indian market for railway air conditioning apparatus appear to be enormous, according to Vice-Consul D. V. Anderson. Once the public has experienced the comfort of cool, dust-free rail travel, it is believed that it will prove so popular that all first and second class carriages will eventually be air conditioned.

An idea of the possibilities of the market can be gained from the fact that the 14 Class 1 Indian railways had 17,850 passenger coaches in operation on March 31, 1936; these cars provided seats for 35,358 passengers in first class, 60,923 in second class, and about 1,111,000 in intermediate and third classes.

It is understood that the equipment for the passenger coaches being built in Bombay has been imported from Europe, largely, if not entirely, from Great Britain.

Builds 15 Conditioned Factories

NEW YORK—In the last three weeks of September 12 contracts for factory construction in 10 different industries have been signed by the Austin Company, industrial engineers and builders, George A. Bryant Jr., executive vice-president, announced recently.

The contracts include work in Illinois, Michigan, Indiana, Ohio, New Jersey, New York, Texas, California and Washington and in Ontario and Quebec. Provisions for air conditioning are included in fifteen plants now under construction by the company, which also is building factories for four concerns in the air conditioning equipment business.

15F Set as Maximum Differential for Cincinnati A.C. Buildings

WASHINGTON—Enactment of an ordinance in Cincinnati, limiting to 15F the differential between the temperature of any air conditioned building and the temperature outside, is endorsed by William B. Henderson, executive vice-president of the Air Conditioning Manufacturers' Association, as a wise and definite step to end misuse and incorrect operation of air conditioning equipment.

According to Mr. Henderson there is no reason for discomfort-causing differences of temperature between outdoors and indoors in the case of air conditioned structures. The degree of warmth or coolness inside the structure is directly under the control of the building engineer. Investigation almost always reveals that if there is an uncomfortably wide range between the two temperatures, it is because of an injudicious over-selling of the system's comfort features.

The differential between the inside and outside temperatures never should exceed 15 to 18F, according to Dr. Irving S. Cutter, Dean of the Northwestern University Medical School. Giving a large office building as a particular example of well-regulated air conditioning, Doctor Cutter recently pointed out that the humidity and temperature are so controlled that there is no sense of discomfort. He added that physicians and nurses working in air conditioned operating rooms in a Chicago hospital have never found the slightest difficulty and have nothing but praise for the added efficiency which the air conditioning installation affords.

21 Enroll in A.C. Extension Course Offered by Massachusetts

BOSTON—Twenty-one men enrolled at the opening session of the University Extension course in air conditioning, Massachusetts State Department of Education, September 7. Classes are being held at the Massachusetts Institute of Technology, Tuesday and Thursday evenings. One course covering air conditioning for residences, stores, offices and restaurants, is conducted by P. A. L. Foulds, consulting engineer, and consists of eight lectures, covering selection of equipment, calculations for application of air conditioning to various types of construction, capacity requirements and controls.

Prof. Raymond U. Fitz of Tufts College has charge of the second course, which begins November 9 at M. I. T. and consists of 15 lectures, the course also being offered by correspondence. It presents the fundamentals of air conditioning, together with illustrative examples.

Another course, in practical thermodynamics, begins October 28 and continues through 16 lessons. John D. Shore, instructor in theory of structures and engineering mathematics at Lincoln Institute, has charge of this course, intended for practical men who need a knowledge of the theory required for all branches of heat engineering. Applications of principles to everyday problems are emphasized, including compressed air equipment, steam engines and boilers, turbines, and refrigerating machinery.

Morris Jarcho Honored at Dinner

NEW YORK—Outstanding members of many firms were present at the industry's testimonial dinner to Morris Jarcho of Jarcho Brothers, heating contractors, October 28, at the Building Trades Employers Association, 2 Park Avenue, it was announced by Louis K. Berman, president of the Raisler Heating Company, co-chairman.

The dinner was in tribute to Mr. Jarcho in recognition of his 20 years continuous service as chairman of the Plumbing, Heating and Air Conditioning industries division of the Federation for the Support of Jewish Philanthropic Societies of New York City.

Pipe Welding to Be a Feature at Acetylene Welding Convention

NEW YORK—Outstanding leaders in the welding industry are to appear on the program of the 38th annual convention of the International Acetylene Association which will be held this year in Birmingham, November 10-12.

The program includes meetings which will be of interest to everyone in the welding industry and to all who use welding or cutting. Three technical sessions are to be held in the afternoons.

Among the features of interest on the program will be a paper entitled Piping Design, Fabrication and Erection, by O. B. McLaughlin, Freeport Sulphur Co., Port Sulphur, La., and also one entitled Welding of Power Piping, by Lee Hopkins, John W. Danforth Co., Buffalo, N. Y.

Pipe welding is scheduled as one of the subjects to be discussed at a round table, to be held Wednesday and Thursday evenings.

Among the advisers to be present at the round table discussions are: W. D. Halsey, Hartford Steam Boiler Inspection and Insurance Co.; H. L. Whittemore, U. S. Bureau of Standards; Dr. G. V. Slottman, Air Reduction Co.; Dr. A. B. Kinzel, Union Carbide and Carbon Research Laboratories, Inc.; H. C. Whittmer, Republic Steel Corp.; J. R. Dawson, Union Carbide and Carbon Research Laboratories, Inc.; R. F. Helmkamp, Air Reduction Co.; A. J. Beldon, The Linde Air Products Co.; J. J. Crowe, Air Reduction Co., and H. F. Reinhard, secretary, International Acetylene Association.

Ventilation of Parliament Delayed

LONDON — British Members of Parliament will continue for another year to suffer from cold feet, for although investigations into the heating and ventilating systems of the Chambers of the House of Commons and the House of Lords have been concluded, the alterations recommended cannot be started before the long recess next year.

At some time during nearly every session of Parliament for many years past emphatic complaints have been made about the ventilation. For the Chamber of the House of Commons air is drawn from the riverside, passed through a washing screen, heating and equalizing rooms, and then sent up through the floor of the room. A similar, though less elaborate, system is in use in the House of Lords.

These systems cool the feet of members, and allow insufficient air movement around their heads. On the recommendation of an interdepartmental committee, the engineering staff of the Office of Works has collaborated with Dr. T. Bedford in investigating the House of Lords Chamber. Their report has just been completed and has been presented to the Office of Works. This completes the technical investigations of the systems in both Houses.

For the House of Commons the investigation was completed some time ago, and the following three suggestions have been made: Installation of electric heaters; new system of admitting fresh air: installation of a complete air conditioning system.

The reports will be considered by Sir Philip Sassoon, First Commissioner of Works, during the next few months, and any work decided upon will be budgeted for in next year's Office of Works estimates.

Warm Air Association to Observe Its 20th Year of Research

COLUMBUS—According to Allen W. Williams, managing director of the National Warm Air Heating and Air Conditioning Association, the numerous activities of that organization have been vigorously pushed during the past summer. At present the association is preparing for its winter convention which is to be held in the Roosevelt Hotel, New York, January 25-26, 1938, at which time will also be held the International Heating and Ventilating Exposition in Grand Central Palace. The ASHVE will meet at the same time in the Biltmore Hotel.

The association is planning to celebrate during its winter meeting the 20th anniversary of its research work which has been carried on continuously in cooperation with the University of Illinois during the past two decades.

William R. Sweatt

MINNEAPOLIS, MINN.—William R. Sweatt, founder and former head of Minneapolis-Honeywell Regulator Company, and one of the pioneers in the field of automatic controls, died here October 12. He was 71.

His first company was the Electric Thermostat Company, which was formed in Minneapolis in 1885, of which he was secretary-treasurer. This company later became the Minneapolis-Heat Regulator Company, and in 1927, the Minneapolis-Honeywell Regulator Company. Mr. Sweatt was named president of the company in 1893, a position he held until 1927, when he became chairman of the board of directors. He retired in 1933 and moved to Florida, establishing his residence in Palm Beach.

He is survived by his wife, two daughters, and two sons. The latter, Harold W. Sweatt and Charles B. Sweatt, are president and vice-president in charge of sales, respectively, of Minneapolis-Honeywell.

Frank B. Howell

NEW YORK—Frank B. Howell, 74, associated with American Radiator Company for more than 40 years, died October 10 in the Lenox Hill Hospital here.

Until 1905, Mr. Howell served successively as manager of the company's Buffalo branch, assistant manager of the Detroit plant, and manager of the Bond plant in Buffalo. He was made superintendent of the eastern branches of the company in February, 1905, and served in that capacity until 1907 when he was made assistant general manager of sales with offices in Chicago. He was made head of the Institute of Thermal Research, then located in Buffalo, in 1913, and in 1928 was transferred to the executive branch of the company. Since that time he served in various capacities in the company.

Mr. Howell was a member of the ASME boiler code committee and acted as chairman of the sub-committee on heating boilers until the time of his death. He was a member of the ASHVE, American Gas Association, Engineers' Club of New York, and served on the committee on heat transmission of the National Research Council. He is survived by his wife, one brother, one sister, a niece, and a nephew.

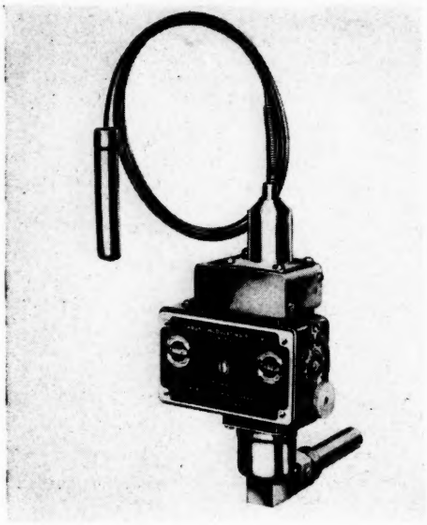
Percy C. Brooks

CHICAGO—Percy C. Brooks, former executive vice-president of Fairbanks, Morse & Co., died here October 15. He was 65. Mr. Brooks was associated with Fairbanks, Morse for nearly 40 years.

Walter E. Stevens

SOMERVILLE, MASS.—Walter E. Stevens, assistant vice-president and manager of eastern division sales of Walworth Company, died here suddenly on October 13. Mr. Stevens had been associated with Walworth since 1907.

NEW EQUIPMENT



Thrush Boiler Water Control

NAME AND MODEL NUMBER—Thrush modulating boiler water control No. 203.

PURPOSE—A boiler control for hot water heating systems which automatically raises or lowers the temperature of the water to meet the demands placed on the heating system.

FEATURES—For most satisfactory results this control should be used in connection with the No. 201 Thrush radiant heat control, water circulator, and flow control valve. This modulating boiler water temperature control maintains any desired minimum boiler temperature to provide domestic hot water in summer or winter. When more heat is necessary the boiler water temperature is automatically raised. The manufacturer claims substantial fuel savings due to the fact that on all high temperature installations where it is usually necessary to set the boiler control to maintain 210F throughout the heating season, with this new type of instrument the 210F is maintained only during the peak load season and lower temperatures are carried through the rest of the season.

METHOD OF OPERATION—When used with a system providing domestic hot water the boiler control operates to maintain the boiler water temperature at the dial setting providing the room thermostat does not call for heat. If, however, the room thermostat calls for heat at frequent intervals, indicating that the outdoor temperature is low, the radiator and the return line temperature will rise because of the frequent operation of the circulator. The feeler bulb which is clamped to the return line now comes into play and automatically raises the operating temperature of the boiler control. Thus the temperature of the return line is used to indicate changes of outdoor temperature and automatically raises or lowers the boiler water temperature sufficiently to meet the heating demands. In mild weather when the radiator and return line temperatures are kept low, because of the operation of the control, the boiler temperature can be maintained between 155F and 165F. In colder weather the radiator and return line temperatures will increase and the boiler temperature will also increase, always being maintained about 20F higher than the return line temperature. The maximum boiler temperature adjustment which can be reached is limited by the control to a temperature of approximately 230F so that the boiler temperature cannot rise to the dangerous point.

MADE BY—*H. A. Thrush & Co., Peru, Ind.*

Haveg Fume Duct

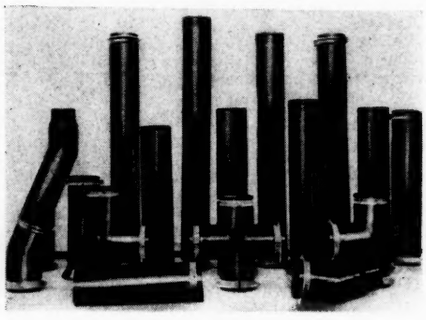
NAME—Haveg fume duct.

PURPOSE—To resist corrosive fumes.

FEATURES—Haveg fume ducts are molded from a mixture of special acid-washed asbestos and a synthetic phenol formaldehyde resin. It is said that this duct is resistant to practically all acids and salts, to chlorine, to the weaker bases and many solvents and other chemicals. It is also claimed that the duct is not affected by rapid temperature changes and can be used continuously at temperatures as high as 265F without damage. The duct has a low thermal conductivity and it is normally unnecessary to insulate. Two types of fume ducts are available, one with a flanged end and the other with a bell end.

SIZES—Made in sizes from 2 to 30 in. and in standard lengths of 10 ft.

MADE BY—*Haveg Corp., Newark, Del.*



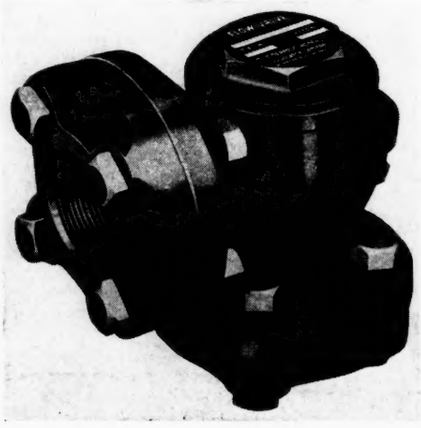
M-H Angle Flow Valve

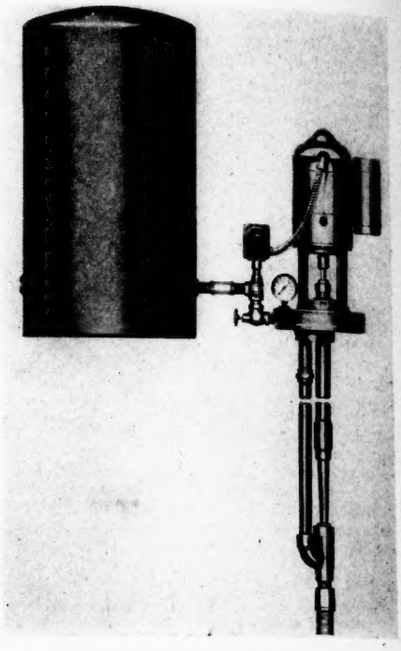
NAME AND MODEL NUMBER—Minneapolis-Honeywell type V563 angle flow valve.

PURPOSE—To prevent gravity circulation in hot water heating systems supplying domestic hot water.

FEATURES—The manufacturer states that when this angle flow valve is installed with a water circulator, domestic hot water is made available the year around, distribution is equalized and circulation is improved. It is said that installation of this device will reduce control and installation costs since the valve acts both as a flow valve and elbow. The valve contains a new valve disc construction that balances the pressure head to assure against leakage from gravity circulation. The material in the valve body is brass for the 1 in. size and cast iron for the 1½ in. and 2 in. sizes.

MADE BY—*Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.*





Fairbanks-Morse Well Pump

NAME—Fairbanks-Morse centrifugal pump.

PURPOSE—For general service in deep or shallow wells.

FEATURES—This pump was designed to meet the need for a small diameter, low capacity pump with low initial and operating costs. It is said to be fitted for pumping water under either high or low pressures at 6 to 60 g.p.m. Units for shallow well service consist of a combined motor, pump and base, into the bottom of which is screwed a single suction pipe extending below the water line. This is satisfactory for water lifts of 15 to 20 ft. Pumps for deep wells, 20 to 200 ft., are equipped with an ejector and venturi in one of two drop pipes extending from the pump down into the well. By allowing a predetermined amount of water from the pump discharge to bypass down one of the pipes in the well and back up through the ejector into the venturi, a vacuum is created above the ejector nozzle, drawing well water into the suction chamber. The high velocity of water through the venturi and the mixing of the two streams of water lift the well water to within reach of the pump suction. The illustration shows the ejector centrifugal pump with pressure tank and automatic controls for deep well service.

LITERATURE AVAILABLE—Bulletin 6640.

MADE BY—*Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago.*

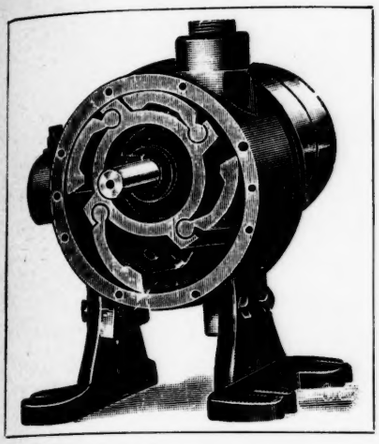
Jenkins Valve

NAME—Jenkins plug-seat valve.

PURPOSE—For severe service such as continuous throttling for pressure reduction or free blow duty such as soot blowers, injectors, heating coils, or any steam line where close regulation is required.

FEATURES—This valve features a plug and seat ring made of Jenkins JX500, a stainless steel having a Brinell hardness in excess of 500. It is said that this plug and seat practically nullify wear and almost entirely eliminate danger of wire drawing and cutting.

MADE BY—*Jenkins Bros., 80 White St., New York.*



Leiman Vacuum System

NAME—Leiman vacuum system.

PURPOSE—For maintaining vacuums on steam heating systems.

FEATURES—This vacuum system consists of a rotary vacuum pump with a motor, separator tank, and all the attachments necessary for removing air from heating systems. The manufacturer states that this system does not interfere with the ordinary steaming of a heating system and only operates when air binds one of the radiators. The rotary air vacuum pump used for maintaining the vacuum has a series of wing vanes which are said to take up their own wear. Available in a number of sizes.

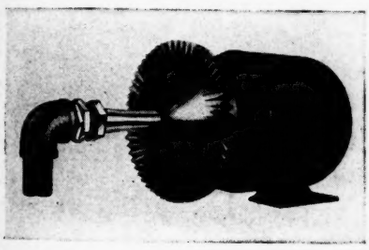
MADE BY—*Leiman Bros., Inc., 101-103 Christie St., Newark, N. J.*

Murray-Preston Spray Wheel

NAME—Murray-Preston spray wheel.

PURPOSE—For generating water spray.

FEATURES—This spray wheel is made of



metal or alloy to meet the respective chemical or corrosion conditions and is totally machined. The spray or fog-generating medium is an integral part of the entire unit. Delivery is through the nozzle and it is said that the spray wheel cannot become clogged no matter what the form of contamination. The manufacturer claims that the device is self-cleaning and forms a steady uniform spray. It is readily adaptable to air washers or other equipment having banks of spray nozzles. The manufacturer states that low pressure requirements, together with its large space coverage, make for lower operating cost. The motor is directly connected and is of the totally enclosed and splashproof type.

MADE BY—*D. J. Murray Mfg. Co., Wausau, Wis.*

Peerless Furnace

NAME—Streamlined oil furnace and furnace for burning coal or coke.

PURPOSE—For supplying warm air.

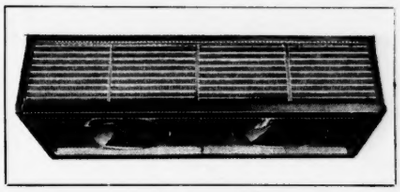
FEATURES—The oil furnace is constructed specifically for oil as a fuel and is designed for a gun type burner. The burner units are housed in a streamlined vestibule with a front panel that opens. This furnace includes a Peerless warm air heating unit, Peerless Cleanaire blower, and ABC oil burner. The heating unit has a combustion drum of heavy gage steel boiler plate riveted and arc welded. Horizontal heat transfer tubes are placed in staggered positions to expose greater areas to the heated air. An automatic humidifier connected to the city water supply is said to require no attention. The Peerless furnace for coal or coke is adaptable either to stoker or hand firing and as on the oil furnace, the blower and humidifier are integral parts of the furnace. In this furnace, air slots back of the firebrick permit warm air to pass over the top of the fire to mix with gases. The boiler is protected from flames by a brick lining which extends to the smoke outlet.

MADE BY—*Peerless Foundry Co., Indianapolis, Ind.*

Trane Multiple Projection Heater

NAME—Trane multiple projection heater.

PURPOSE—A unit heater for projecting warm air down to the floor.



FEATURES—This multiple projection heater employs the same operating principles as the new Trane projection unit heater. It is primarily designed and intended for use where a maximum of space must be heated with a minimum of units. The manufacturer claims that a single unit mounted in the center of a large space will take care of the huge floor area. The heater consists of two Trane extended surface coils contained within a metal casing. The motors are mounted out of the path of the air on a resilient construction. A new blade propeller fan, designed for quiet operation, is employed. In operation this heater draws warm air from the ceiling, through the two heating coils and then projects it straight downward in a vertical stream to the floor.

TYPES AVAILABLE—Available with two, three or more fans.

MADE BY—*The Trane Co., La Crosse, Wis.*

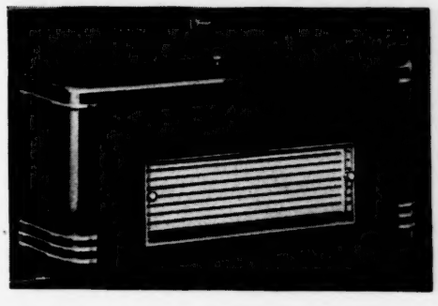
Pacific Air Circulator

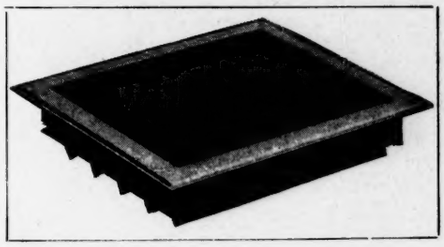
NAME—Airvent.

PURPOSE—For window installation to supply filtered outside air and to eliminate street noises.

FEATURES—Filters in this unit are said to remove 98% of the dust from the outside air. The exterior of the cabinet is especially fitted to prevent rusting. Unit has two speeds and is capable of supplying 300 c.f.m.

MADE BY—*Pacific Mfg. Corp., 4223 W. Lake St., Chicago.*





Auer Register

NAME—DuraBilt register and cold air faces.

PURPOSE—A register face with large air capacity and with meshes close enough to exclude small objects.

FEATURES—This new register face is of the steel cross-bar construction type, each cross-joint having a mortised and locked fit. Each cross-member is also locked to the frame by a hooked joint.

MADE BY—*The Auer Register Co., Cleveland, Ohio.*

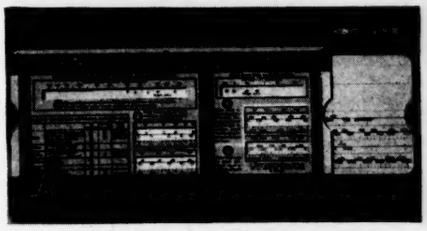
Crane Heating Calculator

NAME—Crane heating calculator.

PURPOSE—For the determination of heat loss in buildings and the correct selection of radiators and boilers.

FEATURES—It is said that this calculator is extremely simple and accurate. Once the temperature differences and areas to be heated are determined, the various heat losses in B.t.u. are revealed on a sliding scale. The total of these when applied to this scale reveals the required amount of radiation. Another scale tells which Crane boiler will meet the demands of the heat loss of the building. The heating calculator has been designed in accordance with the ASHVE method of determining heat losses.

MADE BY—*Crane Co., Chicago.*



G-E Oil Boiler

NAME AND MODEL NUMBER—G-E oil boiler, type LA-3.

PURPOSE—For supplying steam or hot water using oil as a fuel.

FEATURES—Boiler is of welded steel construction and it is equipped with an indirect heating coil for domestic hot water, safety relief door, safety valve, pressure gage, low water cutoff, water level indicator for steam boilers, and an altitude gage and thermometer for hot water boilers. The boiler is of the vertical type with concentric flue surfaces and firebox of steel. One inch of asbestos insulation is used. During the starting cycle a flame detector permits continued oil flow only if combustion is properly established. In the event of flame failure after combustion is established, the motor compressor is immediately stopped and the oil valve closed.

SIZES AND CAPACITIES—Maximum rating, 100,000 B.t.u. per hr., equivalent to 417 sq. ft. of steam radiator surface or 667 sq. ft. hot water surface.

MADE BY—*General Electric Co., Air Conditioning Dept., Bloomfield, N. J.*

Degree-Day Figures for September, 1937

With this issue HEATING & VENTILATING begins its tenth year of publishing degree-day data for various large cities.

	Albany, N. Y.	Atlanta, Ga.	Baltimore, Md.	Birmingham, Ala.	Boston, Mass.	Buffalo, N. Y.	Burlington, Vt.
Degree-days for September, 1937.....	164	19	61	7	128	181	226
Degree-days for September, 1936.....	110	0	28	0	122	122	217
Degree-days for September, Normal....	72	0	0	0	48	75	144

	Cheyenne, Wyo.	Chicago, Ill.	Cincinnati, Ohio	Cleveland, Ohio	Columbus, Ohio	Denver, Colo.	Des Moines, Iowa
Degree-days for September, 1937.....	162	120	103	134	112	69	90
Degree-days for September, 1936.....	216	63	49	77	53	148	62
Degree-days for September, Normal....	240	3	0	27	0	72	0

	Detroit, Mich.	Dodge City, Kan.	Duluth, Minn.	El Paso, Tex.	Erie, Pa.	Evansville, Ind.	Fort Wayne, Ind.
Degree-days for September, 1937.....	178	26	286	0	154	48	156
Degree-days for September, 1936.....	105	93	221	36	86	18	83
Degree-days for September, Normal....	42	0	261	0	36	0	0

	Grand Rapids, Mich.	Harrisburg, Pa.	Hartford, Conn.	Indianapolis, Ind.	Kansas City, Mo.	La Crosse, Wis.	Lincoln, Neb.
Degree-days for September, 1937.....	164	112	154	109	35	163	54
Degree-days for September, 1936.....	111	52	100	61	51	105	66
Degree-days for September, Normal....	57	0	48	0	0	96	0

	Little Rock, Ark.	Los Angeles, Calif.	Louisville, Ky.	Madison, Wis.	Memphis, Tenn.	Milwaukee, Wis.	Minneapolis, Minn.
Degree-days for September, 1937.....	15	0	71	160	19	145	166
Degree-days for September, 1936.....	3	0	25	111	1	89	92
Degree-days for September, Normal....	0	0	0	87	0	84	93

	Nashville, Tenn.	New Haven, Conn.	New Orleans, La.	New York, N. Y.	Norfolk, Va.	Oklahoma City, Okla.	Omaha, Neb.
Degree-days for September, 1937.....	34	127	0	91	16	14	69
Degree-days for September, 1936.....	1	79	0	46	4	47	66
Degree-days for September, Normal....	0	39	0	0	0	0	0

	Peoria, Ill.	Philadelphia, Pa.	Pittsburgh, Pa.	Portland, Me.	Portland, Oreg.	Providence, R. I.	Reading, Pa.
Degree-days for September, 1937.....	115	75	119	180	89	127	101
Degree-days for September, 1936.....	58	37	48	187	81	107	59
Degree-days for September, Normal....	3	0	0	120	105	63	0

	Richmond, Va.	Rochester, N. Y.	St. Louis, Mo.	Salt Lake City, Utah	San Francisco, Calif.	Scranton, Pa.	Seattle, Wash.
Degree-days for September, 1937.....	58	196	47	46	134	173	136
Degree-days for September, 1936.....	13	106	31	105	104	90	165
Degree-days for September, Normal....	0	72	0	18	114	60	192

	Spokane, Wash.	Syracuse, N. Y.	Toledo, Ohio	Trenton, N. J.	Utica, N. Y.	Washington, D. C.	Wichita, Kan.
Degree-days for September, 1937.....	138	187	161	105	208	78	27
Degree-days for September, 1936.....	185	120	85	52	126	26	59
Degree-days for September, Normal....	192	96	9	0	182	0	0

	Fort Worth, Tex.	Green Bay, Wis.	Ithaca, N. Y.	Knoxville, Tenn.	Lansing, Mich.	Reno, Nev.	Springfield, Ill.
Degree-days for September, 1937.....	1	199	221	20	224	76	80
Degree-days for September, 1936.....	25	123	136	1	148	132	44
Degree-days for September, Normal....	0	132	96	0	114	144	0

Methods of applying the degree-day in connection with the operation of heating plants or for the prediction of fuel consumption of heating plants are described fully in the DEGREE-DAY HANDBOOK, published in 1937, by HEATING & VENTILATING, 148 Lafayette Street, New York, price $3. Degree-days as given above for a "normal" month or season are based on averages for a long period of years, ending about 1922. Averages covering different periods will disagree with the above figures slightly.

a Responsibility

AND AN ACCOUNTING

IN 1927, after exhaustive experiments which required 10 years to complete, The American Brass Company recommended Anaconda Red-Brass Pipe containing 85% copper as the highest quality corrosion-resistant pipe obtainable at a reasonable price.

This recommendation has been fully justified by service records.

Over 14 million feet of Anaconda "85" Red-Brass Pipe have been installed for hot and cold water lines in all sections of the country, and only one length, which escaped inspection, has been replaced. This is the only failure on record.

We feel justly proud of this 10-year record of quality control—in both the alloying and the fabrication of Anaconda "85" Red-Brass Pipe.

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Anaconda "85" Red-Brass Pipe

THE AMERICAN BRASS COMPANY, General Offices: WATERBURY, CONNECTICUT

Offices and Agencies in Principal Cities • In Canada: ANACONDA AMERICAN BRASS LTD., New Toronto Ont.

Summer Degree-Hours — An Estimating Unit for Summer Air Conditioning

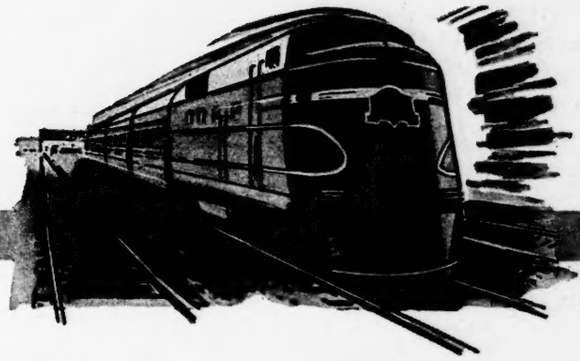
Continuing a monthly service in HEATING & VENTILATING covering summer dry-bulb temperatures in 31 cities

THERE is a fair amount of evidence that that part of the cooling load in air conditioning which depends on the outdoor dry bulb temperature is proportional to the number of hours the temperature is above 85F. The calculation of the number of these degree-hours in the summer depends on the availability of hourly dry bulb temperature readings and for that reason data can not be prepared for all cities. However, the table below gives the number of degree-hours for September and cumulative total to September 30 for 31 cities.

The degree-hour unit is similar to the degree-day unit used for winter estimating, differing however in one important respect—the number of degree-days in a given month in a given city usually compares within ± 20% of the number for the same month in other years; this is not the case with degree-hours which fluctuate all the way from zero to over 800 in the same month in different years. Consequently, the unit does not lend itself to predicting as does the degree-day unit. However, it does enable one to make comparisons of a part of the sensible heat load, with the temperature variable eliminated.

Summer Degree-Hours (Above 85F), September, 1937

September, 1937	September, 1936	City	Year, 1937, to September 30	Year, 1936, to September 30
147	113	Baltimore	1543	2025
57	315	Birmingham	2789	3906
85	120	Bismarck	1660	4624
73	11	Boston	704	356
0	0	Buffalo	27	111
122	94	Chicago	652	1137
121	389	Cincinnati	1032	3937
6	59	Cleveland	165	710
94	279	Columbus	854	2797
375	243	Des Moines	2488	6560
65	75	Detroit	512	1879
42	115	Fort Wayne	542	2714
102	56	Grand Rapids	980	1901
457	517	Houston	3957	3774
55	304	Indianapolis	833	4432
499	970	Kansas City	4975	12399
90	390	Memphis	2057	4657
185	31	Milwaukee	694	1090
229	122	Minneapolis	1835	3017
351	532	New Orleans	2620	3450
47	4	New York	500	560
100	46	Philadelphia	1003	1255
66	87	Pittsburgh	538	1262
58	6	Portland, Oreg.	208	174
93	305	Richmond, Va.	1339	2167
125	534	St. Louis	2368	8361
14	0	San Diego	14	9
8	24	San Francisco	9	24
164	387	Savannah	2260	3471
43	132	Toledo	580	2064
133	128	Washington	1279	1945



CONTROLS *Guard*

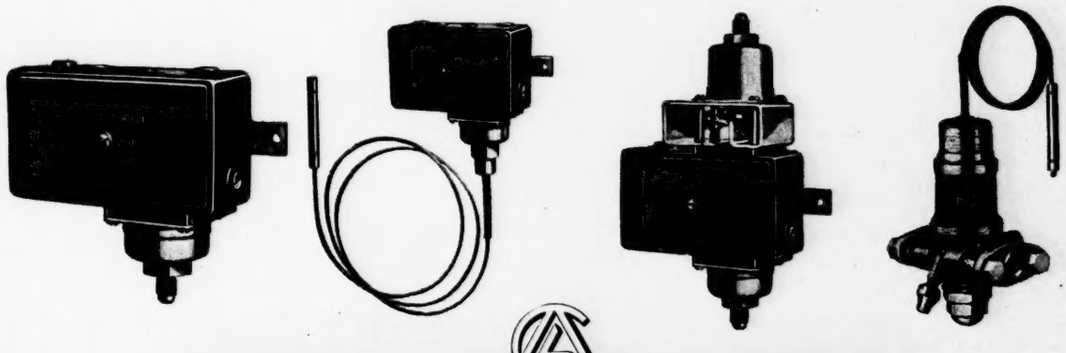
SAFETY, ECONOMY and COMFORT

Accurate and dependable control is one of the outstanding characteristics of the new Chicago, Rock Island & Pacific Rocket Trains which open a new epoch in rail transportation.

Both the comfort of the Rocket's passengers and the safety of its powerful engines are protected by modern automatic control equipment.

It is significant that "Genuine Detroit" Controls were selected for both these purposes. The air conditioning system includes No. 783 Thermostatic Expansion Valve together with No. 250 Dual Pressure Controls. A No. 250 Series Temperature Control notifies the engineer of any excess motor temperature. Another similar unit operates an air damper for automatically cooling the motor. Two No. 250 RB-3 Controls, one on each of the engine's lubrication systems, inform the engineer immediately when the oil pressure drops below a stated safe minimum.

Consistent accuracy, long and dependable service, are always assured in "Genuine Detroit" Controls.



DETROIT LUBRICATOR COMPANY

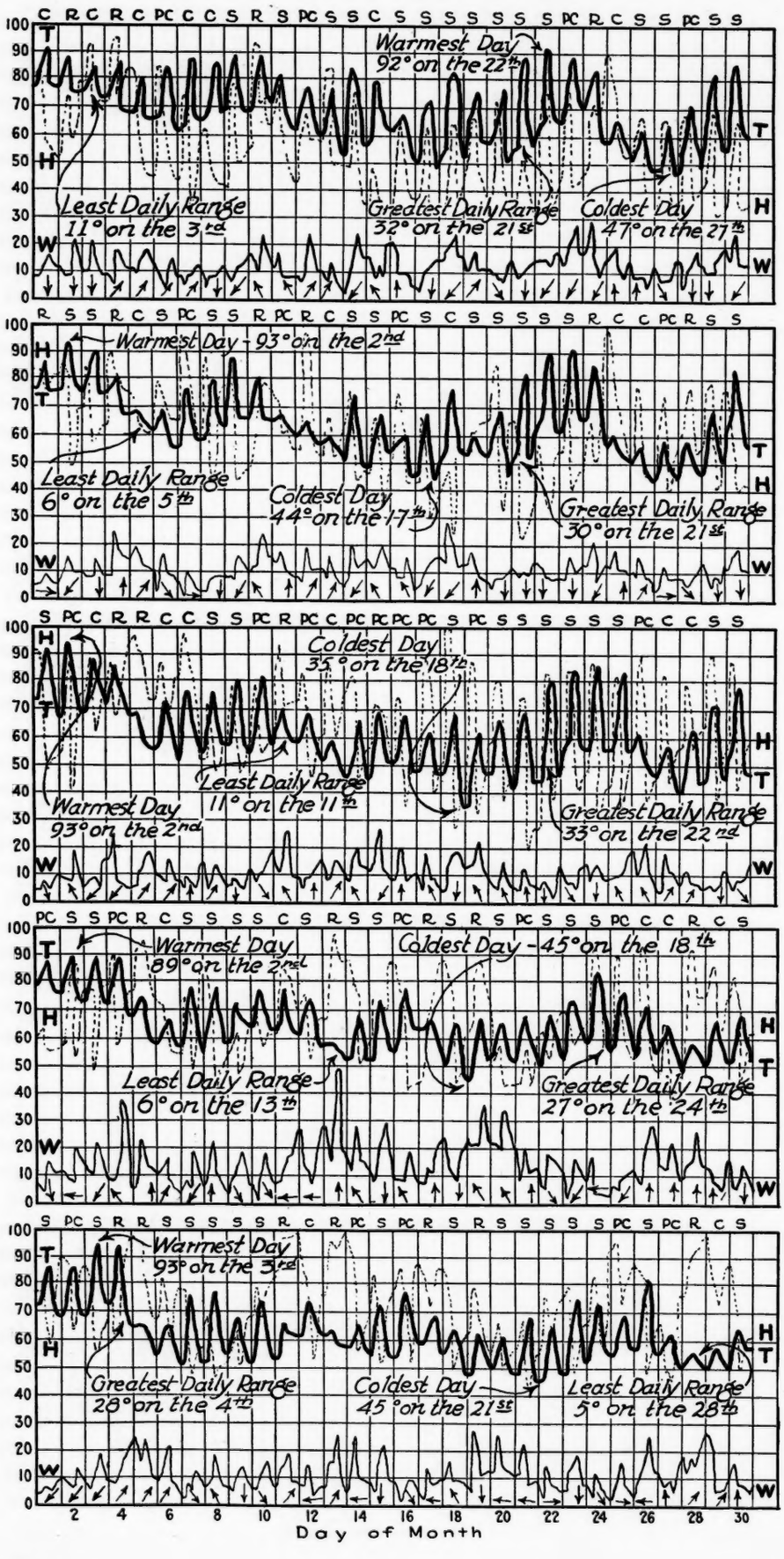
DETROIT, MICHIGAN, U. S. A. • 5900 TRUMBULL AVE.

NEW YORK, N. Y. - 40 WEST 40th ST. • CHICAGO, ILL. - 816 S. Michigan Ave.

DIVISION OF AMERICAN RADIATOR & STANDARD SANITARY CORPORATION

THE WEATHER FOR SEPTEMBER, 1937

Plotted from records compiled for HEATING & VENTILATING by the U. S. Weather Bureau. Heavy curves (T), dry bulb temperatures in deg. F.; dotted lines (H), per cent relative humidity from readings at 8 a.m., noon, and 8 p.m. Light lines (W), wind velocity in m.p.h. Arrows indicate wind direction at maximum velocity, north being arrow pointing up, etc.; S—clear; PC—partly cloudy; C—cloudy; R—rain; Sn—snow.


Warmest Day 92° on the 22nd
Least Daily Range 11° on the 3rd
Greatest Daily Range 32° on the 21st
Coldest Day 47° on the 27th
Warmest Day - 93° on the 2nd
Least Daily Range 6° on the 5th
Coldest Day 44° on the 17th
Greatest Daily Range 30° on the 21st
Coldest Day 35° on the 18th
Least Daily Range 11° on the 11th
Warmest Day 93° on the 2nd
Greatest Daily Range 33° on the 22nd
Warmest Day 89° on the 2nd
Coldest Day - 45° on the 18th
Least Daily Range 6° on the 13th
Greatest Daily Range 27° on the 24th
Warmest Day 93° on the 3rd
Greatest Daily Range 28° on the 4th
Coldest Day 45° on the 21st
Least Daily Range 5° on the 28th
Day of Month

St. Louis

Mean temp. for month, 70.3F; aver. wind velocity, 11.0 m.p.h.; prevailing direction of wind, S.

Chicago

Mean temp. for month, 65.1F; aver. wind velocity, 10.0 m.p.h.; prevailing direction of wind, S.

Pittsburgh

Mean temp. for month, 62.6F; aver. wind velocity, 9.0 m.p.h.; prevailing direction of wind, S.

New York

Mean temp. for month, 65.2F; aver. wind velocity, 11.9 m.p.h.; prevailing direction of wind, N.

Boston

Mean temp. for month, 63.0F; aver. wind velocity, 9.7 m.p.h.; prevailing direction of wind, S.W.

SAVE MONEY . . . SAVE SPACE
SAVE EMPLOYEES' TIME WITH THE

new Janitrol

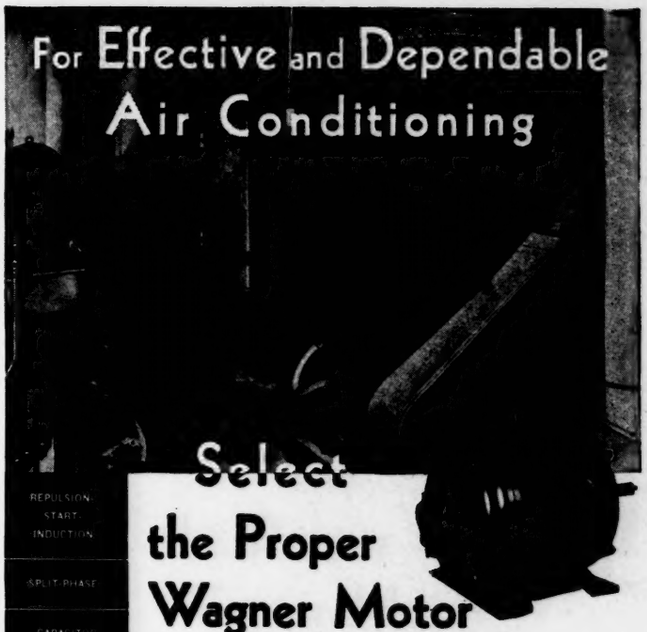
GAS-FIRED
UNIT HEATERS

1. **GREATER EFFICIENCY** . . . no work or worry with the exclusive new Janitrol combination switch and thermostat. No hot spots. No cold spots. Even temperatures protect employees' health.
2. **INCREASED PROTECTION** . . . no possibility of overheating with Janitrol's exclusive combination control switch which automatically operates fan for two minute periods at frequent intervals should special conditions require it.
3. **NEW QUIET IN OPERATION** . . . assured by Janitrol exclusive sonic silencers, heat exchangers of special-processed non-resonant alloy, new-type fan.
4. **HANDSOME APPEARANCE** . . . new design . . . attractive finish . . . all 14 models uniform . . . capacities ranging from 45,000 to 400,000 Btu per hour input.

● Suspended from the ceiling . . . taking up no floor space . . . Janitrol gas-fired Unit Heaters save money, time and space in thousands of commercial and industrial establishments. Completely automatic . . . easy to install . . . economical to operate . . . and now offering outstanding new improvements. Write for full information about the new Janitrol Unit Heaters and cooperative engineering facilities.

SEE OUR EXHIBIT AT THE FIFTH INTERNATIONAL HEATING AND VENTILATING EXPOSITION, GRAND CENTRAL PALACE, NEW YORK . . . JANUARY 24th TO 28th, 1938

SURFACE COMBUSTION CORPORATION
TOLEDO, OHIO



REPULSION START INDUCTION
SPLIT-PHASE
CAPACITOR START
SQUIRREL CAGE
CAPACITOR RUN
REPULSION INDUCTION
SHADED-POLE FAN MOTORS
MULTI-SPEED POLYPHASE
SYNCHRONOUS
GEAR-MOTORS
MULTI-SPEED CAPACITOR
DIRECT-CURRENT APPLIANCE-TYPE
HAZARDOUS-GAS
DIRECT-CURRENT INDUSTRIAL-TYPE
TOTALLY-ENCLOSED FAN-COOLED
VERTICAL MOTORS
RING-MOUNTED
ANNULAR RUBBER-MOUNTED

Select the Proper Wagner Motor For the Job

Dependable, economical and efficient operation of any air conditioning installation depends largely upon the reliability and performance of the electric motors that drive the equipment. Consequently, manufacturers and contractors who recognize the value of dependable and sturdy motors for their air conditioning installations specify Wagner motors to solve their drive problems. They know that the selection of the correct Wagner motors helps their equipment to give better, more dependable, more economical, and more efficient service.

Wagner builds all types of motors generally applied on air conditioning machinery, making it possible for you to choose motors exactly suited for your installations. Wagner motors are available with proper mechanical and electrical characteristics to fit the varying requirements of compressors, pumps, air-movement devices, and all types of ventilating equipment.

The above picture illustrates a typical air conditioning application using Wagner motors. A Wagner 7½-hp type RP polyphase squirrel-cage motor is belt-connected to the air conditioner in the basement of a large department store in Texas.

On your next air conditioning design or installation problem—consult Wagner. Wagner's experience will be helpful to you. Send for descriptive literature today.

ML437-1L

Wagner Motors

Wagner Electric Corporation
6400 Plymouth Avenue, Saint Louis, U.S.A.

MOTORS TRANSFORMERS FANS BRAKES

STERLING
VACUUM PUMPS

COMPACT
New DESIGN!

Announcing

Type "S"... NEW!... COMPACT!
LONG LASTING!... ATTRACTIVE!

- **No Outside Piping...**
- **One Enclosed Impeller Centrifugal Bronze Fitted Pump, Delivering Through a Venturi (Ejector) Type Vacuum Producer...**
- **No Separate Air Pump With Close Clearances to Wear Out in a Few Years...**
- **After Years of Service, the Efficiency of a "Type S" is as High as When New, Without Repairs, Adjustments or Replacements...**
- **Special Automatic Discharge Valve Operated by Pump Pressure and Controlled by Solenoid Pilot Valve Insures Positive Return to Boiler...**
- **Strainer Built Into Receiver... Screen Easily Removed for Cleaning...**
- **Thermometer Mounted on Accumulator Tank Indicates Temperature of Return Line Water...**
- **Clear Vision Water Gauges on Receiver Compartments Indicate Water Level Through Clean Glasses...**

Write for Bulletin No. 372

STERLING ENGINEERING CO.

3734 N. Holton Street

MILWAUKEE, WISCONSIN

WITH THE MANUFACTURERS

Airtemp, Inc., Dayton, Ohio, has appointed *A. P. Livar* chief engineer in charge of heating design. He was formerly manager of the air conditioning division of Reynolds Corporation, and prior to that was vice-president in charge of sales and manufacturing for Richmond Radiator Company, where he designed the Richvar cast iron convector radiator and boiler. He was Trane Company's New York manager for seven years. Mr. Livar will now supervise the design of Airtemp residential heating equipment.

The American Rolling Mill Co., Middletown, Ohio, has named *The George H. Soule Co.,* St. Albans, Vt., distributor of its ingot iron.

Automatic Products Company's vice-president, *E. A. Vallee,* was one of the judges of the World Series Baseball Contest recently conducted by the *Airo Supply Co.,* Chicago. Other judges of the contest were Arch Ward, Chicago Daily Tribune sports editor, and I. H. Malin, business manager, Southeast National Bank, Chicago. Charles Knox, South Haven, Mich., was selected as winner of the contest.

Cleveland Steel Products Corp., Cleveland, has named three distributors to handle its Toridheet line of oil-fired equipment—*R. J. Letcher & Son, Inc.,* Asbury Park, N. J.; *W. T. Cook & Co.,* Dayton, Ohio, and the *Kirby Co.,* Peru, Ind. New dealers awarded the Toridheet franchise are: *John A. Dow,* Reading, Mass., and *Mizelle & Wells,* Petersburg, Va.

Delco-Frigidaire Conditioning Div., General Motors Sales Corp., Dayton, Ohio, has named *Earl D. Doty* advertising manager. Associated with Frigidaire and its predecessor, Delco-Light, for 21 years, Mr. Doty will now have charge of advertising covering automatic heating and air conditioning activities, reporting to J. J. Nance, general sales manager.

Detroit Brass & Malleable Works, Detroit, has named *Raymond L. O'Brien,* formerly secretary of the company and manager of the gas range cock division, as executive vice-president and general manager.

Fedders Manufacturing Co., Inc., Buffalo, N. Y., has named *Haynes Selling Co., Inc.,* Philadelphia, representative of its unit heaters and air conditioning lines.

Roy Nelson has been named Chicago branch manager of the heating division of Fedders, which recently moved to new and larger quarters at *112 N. Green St.*

Julien P. Friez & Sons, Inc., Baltimore, Md., has opened new showrooms at 110 Arlington St., Boston, under the supervision of *Harry W. Fiedler.* This office will be operated under the name of Air Conditioning Utilities Company, who also operate under the same name in New York, similarly under Mr. Fiedler's supervision.

Gar Wood Industries, Inc., Air Conditioning Div., Detroit, has inaugurated a pay-in-advance, one-year service arrangement. Under this plan, service is available to Gar Wood users, in cities where company branches are maintained, at their call at any time during the service period. The policy includes inspection, cleaning and lubrication of the burner, adjustment of controls, cleaning of furnace or boiler flues, and checking of the boiler assembly.

General Controls Co., Los Angeles, Calif., has opened a branch office in Chicago at *450 E. Ohio Street*, under the management of *H. G. Wasserlein*, engineer.

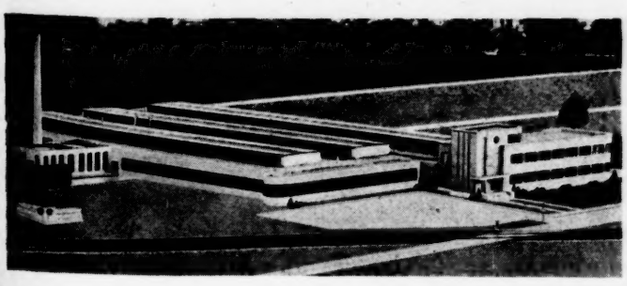
Link-Belt Co., Chicago, has elected *William C. Carter* and *Edward J. Burnell* vice-presidents. Mr. Carter has been associated with Link-Belt since 1902, and was recently in charge of company production. Mr. Burnell, connected with Link-Belt since 1913, was formerly general manager of the company's Chicago plant.

Marsh Tritrol Co., Chicago, has appointed two representatives: *D. S. Wenzlick*, Chestnut St. and 11th, St. Louis, Mo., and *Morris Engineering Co.*, temporarily located at 107 E. Pleasant St., Baltimore, Md.

Minneapolis-Honeywell Regulator Co., Minneapolis, through *J. E. Haines*, assistant manager in charge of the National Regulator Division, has issued a formal statement regarding the company's policy concerning the National Regulator Division. Mr. Haines announced that the increase in orders has made necessary the speeding up of production. He also announced that all old National employes have been retained with the firm, although the organization has been broadened gradually to increase its facilities. In view of the 35 years of experience and ability of the National Regulator Company, Minneapolis-Honeywell is not contemplating any immediate changes in the basic construction and operating characteristics of National controls. However, its Helmet-Sealed thermostat has been outwardly redesigned.

Owens-Illinois Glass Co., Toledo, Ohio, has named *Woolsulate Engineering Co.*, 18 Central Ave., East Orange, N. J., state distributor for its air filters. *R. Abrams* is president of the company.

Penn Electric Switch Company's production facilities for manufacturing air conditioning controls are now located in the new factory at Goshen, Ind. The new plant includes a two-story office building, 42 x 118 ft., with penthouse recreation room, and a one-story, monitor type factory building 210 x 340 ft. completely enclosed by continuous sash, insuring maximum daylight throughout the working area. In a connecting building, 20 x 90 ft., is housed the engineering offices and immediately back of that, in the front section of the fac-



Anderson Super-Silvertops Give You . . .

1 25% MORE HEAT FROM THIS HEATER

2 HEAT 50 MINUTES SOONER

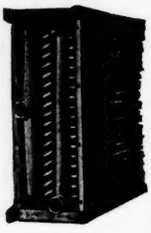
3 SIMPLIFIED PIPING and LOWER INSTALLATION COST

● **Anderson Super-Silvertop, the complete steam trap, offers . . . more heat . . . quicker heat . . . simplified piping. Other advantages: greater capacity, works on vacuum and pressure, only trap with guided bucket, gives fast air elimination at any pressure. Write for further details about the only complete steam trap.**

THE V. D. ANDERSON CO.
1943 WEST 96TH STREET • CLEVELAND, OHIO

AEROFIN
Heat Exchange Surface

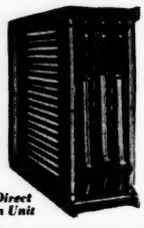
Aerofin Continuous Tube Water Coil



Direct Expansion Unit with Centrifugal Header

Cleanable Tube Unit with Removable Header

Universal Aerofin



Flexitube Aerofin

Aerofin Direct Expansion Unit

OFFERS EVERYTHING
For Heating & Cooling

There is 50,000,000 feet of experience in back of Aerofin heating and cooling surface.

For more than 15 years Aerofin engineers have been designing and building a heat exchange surface which is the standard of comparison by which all equipment of this nature is judged.

Is it any wonder, therefore, that architects, engineers and contractors almost invariably select Aerofin surface to solve their problems?

This vast experience makes Aerofin the dependable choice of the leaders in the Air Conditioning, Heating and Ventilating fields.

Investigate the merits of Aerofin standardized, light-weight heat exchange surface on your next problem. Send for descriptive literature today.

AEROFIN is sold only by Manufacturers of Nationally Advertised Fan System Apparatus. — List upon Request

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410 SOUTH GEDDES STREET
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tory, is the experimental department of the company.

The office building, equipped for year-round air conditioning, symbolizes the latest in modern industrial architecture. Glass brick is used for stair lighting; architectural glass and processed wood paneling for decoration in vestibule and lobby; acoustical plaster in ceilings, and asphalt tile for floors. A square entrance tower with 35 ft. vertical shaft of glass brick provides striking contrast to a general exterior treatment which consists of horizontal bands of sash framed in brickwork.

Stamping and machine operations are centered in the rear of the plant where vibration and noise can be sufficiently isolated to create a minimum of disturbance to employes throughout other parts of the plant and office buildings. The control assemblies are organized in adjacent areas and in close proximity to two testing rooms kept the year-round at constant temperatures of 72F and 104F. It is in these rooms that controls are calibrated and adjusted.

Forced hot water for factory heating and steam for offices are furnished from automatically fired boilers housed in a 58 x 40 ft. building. Heating and cooling units have been installed throughout the factory area, and water used for summer cooling is pumped to the roof where spray nozzles maintain a shower over the roof deck during the day to keep inside temperatures as low as possible. All power circuits for manufacturing operations are taken off enclosed conduit containing both 110 and 220 volt supply lines.

The Trane Co., La Crosse, Wis., recently held a series of four sales meetings in Chicago, Cleveland, Washington, and Newark. Vice-president *D. C. Minard* and unit heater manager *Norbert Downey* represented the company. Daytime meetings were largely devoted to a discussion of the engineering and application phases of the company's products. After a banquet each evening the gathering split up into individual groups in which the various branch managers talked over problems peculiar to their districts.

Vacuum Systems, Inc., 436 The Arcade, Cleveland, Ohio, has been incorporated. This company has acquired the assets of the Crescent Pump Co., Detroit, together with exclusive manufacturing rights. *Wm. A. Hatcher,* inventor of the Crescent pump, will be head of the engineering department and general consultant for all vacuum problems. Officers of the new company are: President, *Louis H. Mesker;* vice-presidents, *B. E. Hathaway* and *H. W. Dosey;* secretary, *W. L. Holloway.*

Young Radiator Co., Racine, Wis., has appointed *M. F. May* vice-president. Associated with Young since 1930, Mr. May has been sales manager of the catalog products division since 1933. In his new position, Mr. May will continue to direct the sales of the catalog products division. His headquarters are at Racine, Wis.

Young Radiator Co., Racine, Wis., has established several new departments and increased its floor space to provide for almost double its former occupancy.

NEW CATALOGS

(Unless otherwise indicated the publishers of catalogs will supply copies on request without charge.)

AIRTHERM MANUFACTURING CO., 1474 S. Vandeventer, St. Louis, Mo., has published a booklet describing the "air blanket" heating method which is said to prevent accumulation of high temperatures under the roof of factories heated with unit heaters.

BINKS MANUFACTURING CO., 3114 Carroll Ave., Chicago, has announced the publication of a 60-page catalog covering its entire line of spray painting and finishing equipment.

HANCOCK VALVE DIVISION, Manning, Maxwell & Moore, Inc., Bridgeport, Conn., has published a four-page illustrated bulletin describing the new Hancock Duravalve, a valve with a Stellite seat developed expressly for high pressure, high temperature service.

JOHNS-MANVILLE CORP., 22 E. 40th St., New York. A standard-size, 16-page bulletin on Johns-Manville products for the plumbing and heating industry. Includes information on pipe covering, range boiler jackets, duct insulation, sheet and block insulation, transite flue pipes, packings and refractory cements.

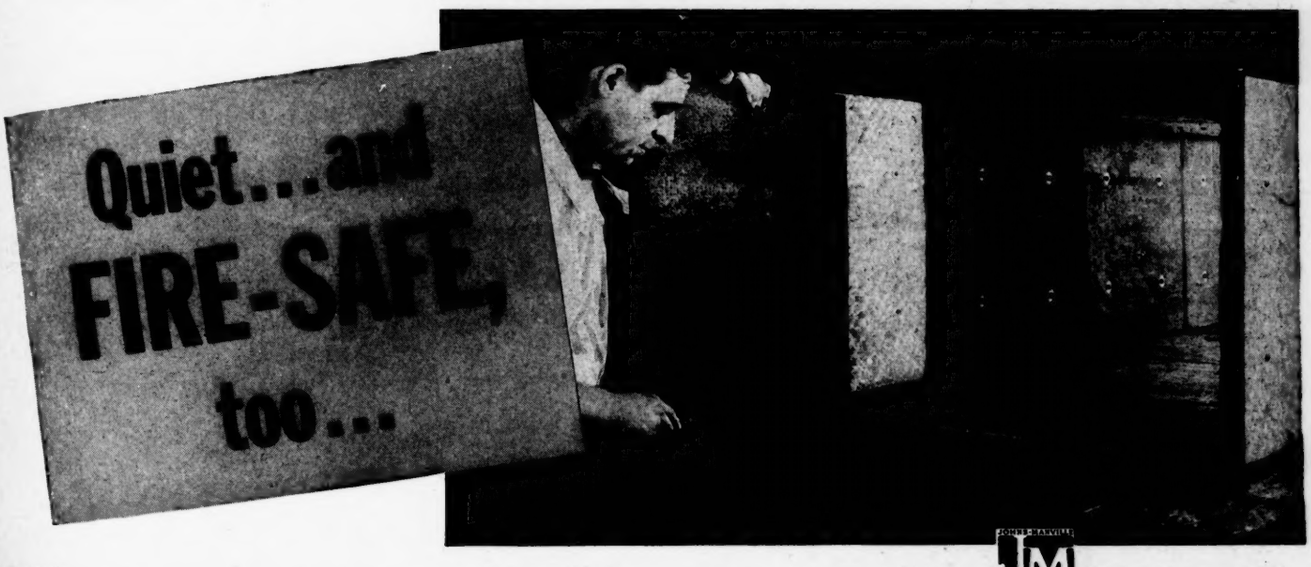
McQUAY, INC., 1600 Broadway, NE., Minneapolis, Minn. A standard-size, loose-leaf catalog, No. 638, on the McQuay all copper element unit heaters. Gives general data on the McQuay line of unit heaters and shows a number of typical installations.

MINNEAPOLIS-HONEYWELL REGULATOR CO., Minneapolis, Minn., has released a new edition of the Condensed Catalog & Price List, a publication which is made up of 48 pages and contains a complete arrangement of all Minneapolis-Honeywell controls and control systems, including its new National pneumatic controls and Brown indicating and recording instruments. Several new price changes on instruments have been included, among which are the new type V435 and V835 gas valves, packless seal water circulator, angle flow valve, and the newly designed National pneumatic thermostats and humidity controllers.

MUELLER BRASS CO., Streamline Pipe and Fittings Division, Port Huron, Mich., has published a standard-size, 64-page catalog G on its line of streamline solder fittings and copper pipe for plumbing, heating, and industrial use. Gives information on how to make perfect joints and lists the dimensions and types of fittings and pipes which are available.

NATIONAL COAL ASSOCIATION, 804 Southern Bldg., Washington, D. C., has published a standard-size, loose-leaf pamphlet on basement plans for modern bituminous coal heating. This booklet is prepared for architects and builders so that they can acquaint their clients with the facts about modern bituminous heating. Includes six typical basement designs as well as designs of coal storage bins.

NATIONAL RADIATOR CORP., Johnstown, Pa. A standard-size, 16-page, loose-leaf bulletin giving the specifications on National oil heating units. Describes the various features and gives ratings, fuel capacities, and dimensions of the National steel oil heating units and National cast iron heating units.



NO SMALL MATTER, the additional factor of fire-safety . . . when lining air-conditioning ducts for sound absorption! Bulletins from the National Board of Fire Underwriters report cases where expensive damage was caused by the absence of this protection.

To make sure *your* air-conditioning ducts will never contribute to fire spread, line them with Johns-Manville Airacoustic Sheets. This material has a rate of sound absorption as high as 80% . . . and provides a high degree of fire-safety as well.

Moreover, J-M Airacoustic Sheets provide many other advantages. Permanence, by virtue of their mineral composition . . . resistance to moisture . . . low thermal conductivity . . . light weight . . . and a smooth surface that means low frictional resistance.

For complete details on J-M Airacoustic Sheets, write Johns-Manville, 22 E. 40th St., New York, N. Y.

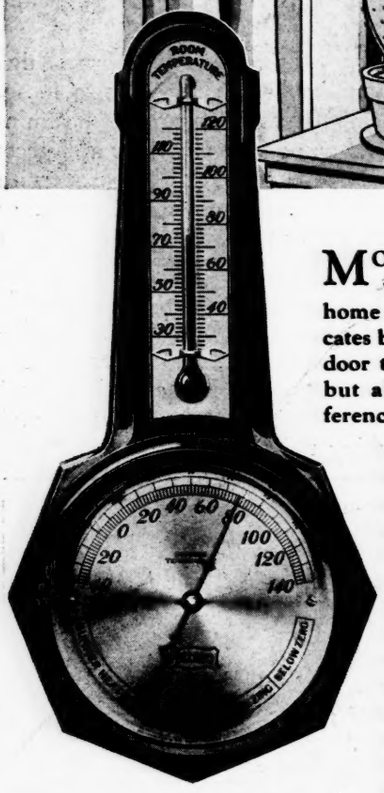
JM PRODUCTS

JOHNS-MANVILLE

AIRACOUSTIC SHEETS

For Duct Lining

INDOOR and OUTDOOR TEMPERATURE *at a Glance!*



MOTOCO located at a convenient place in your home or office not only indicates both the Indoor and Outdoor temperatures at a glance, but also points out the difference between the two.

Indoor temperature to be healthful must be maintained within definite limits. A sudden rise or fall in outside temperature has a direct influence on home heating and ventilation, which cannot be properly regulated without an exact knowledge of the outside temperature changes. MOTOCO keeps you informed at all hours of the day or night.

MOTOCO has an artistic silver finish dial and bevel crystal. It may be obtained in the following colors: maroon, walnut, black, green and ivory.

•

The Motoco line also includes Distance Reading Thermometers, Recording Thermometers, Pressure & Vacuum Gauges and Pressure & Vacuum Recorders for Industrial application.

•

A post card request will bring you complete details of Motoco precision instruments.

MOTOCO
INDOOR AND OUTDOOR
THERMOMETER
PRICE
$12.00

THE ELECTRIC AUTO-LITE COMPANY
MOTO METER GAUGE & EQUIPMENT DIV.
CHRYSLER BUILDING · NEW YORK CITY, N.Y.

SARCO CO., INC., 183 Madison Ave., New York, has published a standard-size, 30-page book entitled "Sarco Steam Hook-Ups," which describes the use of steam traps on various applications. The booklet is based on an accumulation of data over a 25-year period. Principal sections are: Method for calculating trap sizes; hook-ups and descriptions of various types of heating systems including unit heaters and air conditioning; hook-ups for process steam applications; hook-ups for steam headers; hook-ups for temperature control; basic descriptions of the fundamental characteristics of the various types of steam traps, temperature regulators and steam accessories required.

M. B. SKINNER CO., South Bend, Ind., has published a handbook entitled "Pipe Repair Handbook." This booklet discusses all types of leaks in pipe lines and discloses how repairs may be made without service interruption.

THE TRANE CO., La Crosse, Wis., has published two standard-size bulletins. The first bulletin, No. 75, deals with Trane Torridor blower type unit heaters, while the second, No. 110, deals with Trane convectors. Bulletin 74 gives information on the construction features of Torridor unit heaters, tells how to select the correct size, and gives some piping and control diagrams. Bulletin 110 describes the essential features of the Trane convector and shows a number of typical installations.

THE YOUNGSTOWN SHEET AND TUBE CO., Youngstown, Ohio, has published a booklet entitled "What We Make and How We Make it" in the style of a picture magazine to tell the story of steel from the iron ore mine to the finished products. The book consists of 115 pages of steel information, including 135 action photographs taken in the company's mines and mills.

COMING EVENTS

NOVEMBER 3-5, 1937. 4th Annual Convention and Exhibit, Refrigeration Service Engineers' Society, Stevens Hotel, Chicago. Herman Goldberg, Chairman, General Convention Committee, 9 S. Clinton St., Chicago.

NOVEMBER 9-12, 1937. 18th Annual Meeting, American Petroleum Institute, Stevens Hotel, Chicago.

NOVEMBER 10-12, 1937. 38th Annual Convention, International Acetylene Association, Birmingham, Ala. Secretary, 30 East 42nd St., New York.

DECEMBER 6-10, 1937. Annual Meeting, American Society of Mechanical Engineers, New York.

DECEMBER 6-11, 1937. 16th Exposition of Chemical Industries, Grand Central Palace, New York.

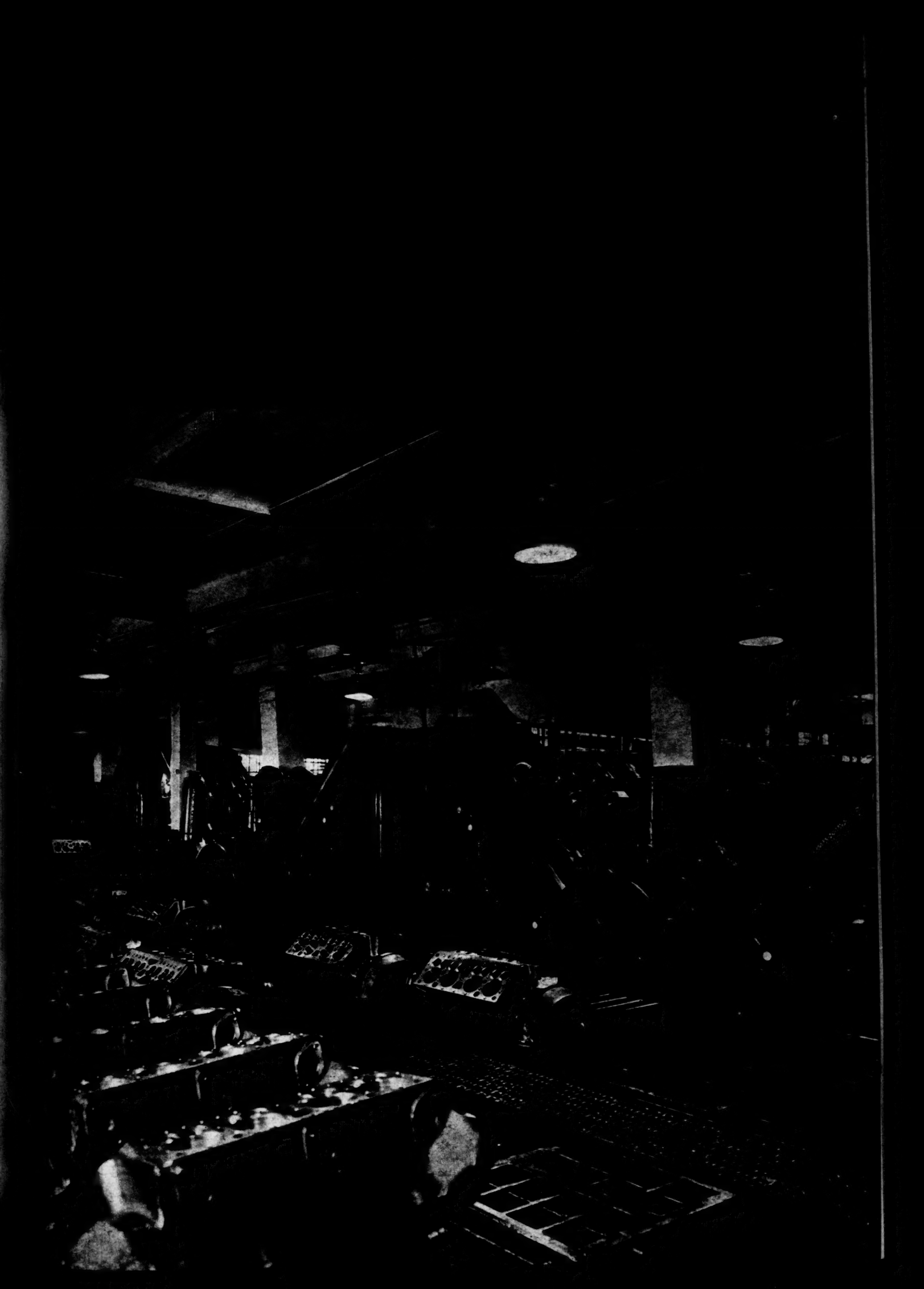
DECEMBER 27-28, 1937. Drying and Air Conditioning. Subject of 4th Annual Chemical Engineering Symposium of the American Chemical Society, University of Pennsylvania, Philadelphia.

JANUARY 24-26, 1938. Winter Convention, National Warm Air Heating and Air Conditioning Association, Hotel Roosevelt, New York.

JANUARY 24-28, 1938. 5th International Heating and Ventilating Exposition, Grand Central Palace, New York. Charles F. Roth, Grand Central Palace, New York.

JANUARY 24-28, 1938. 44th Annual Meeting, American Society of Heating and Ventilating Engineers, New York.

JANUARY 25-27, 1938. 33rd Annual Meeting, American Society of Refrigerating Engineers, Hotel Roosevelt, New York.

APRIL 11-16, 1938. Mechanical Equipment Show, Textile Hall, Greenville, S. Car. William G. Sirrine, President, Textile Hall Corp., Greenville, S. C.

DECEMBER 5-10, 1938. 13th National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York.